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FARM FRIENDS AND
FOES · TALKS ABOUT THE
CREATURES USEFUL TO AGRICUL-
TURE · · *By* J. H. FABRE

TRANSLATED BY BERNARD MIALL

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CONTENTS

	PAGE
I. THE AIM OF THESE TALKS	9
II. TEETH	13
III. VARIOUS FORMS OF TEETH	22
IV. THE BATS	33
V. THE WINGS OF THE BAT	46
VI. THE SCENT AND HEARING OF THE BAT	54
VII. THE HEDGEHOG	60
VIII. HIBERNATION	70
IX. THE MOLE	80
X. THE MOLE'S NEST—THE SHREW-MOUSE	91
XI. A STUPID CRIME	98
XII. NOCTURNAL BIRDS OF PREY	104
XIII. RATS AND MICE	113
XIV. THE VOLES—THE HAMSTER—THE DORMOUSE	122
XV. THE OWLS: I, THE EARED OR HORNED OWLS	132
XVI. THE OWLS: II, THE SMOOTH-HEADED OWLS	140
XVII. THE EAGLE	147
XVIII. THE GOSHAWK — THE SPARROWHAWK — THE FALCONS	155
XIX. THE KESTREL—THE KITE—THE BUZZARDS	162
XX. THE RAVEN	170
XXI. THE CROWS	176

	PAGE
XXII. THE WOODPECKERS	184
XXIII. THE GREEN WOODPECKER—THE SPOTTED WOOD- PECKERS—THE WRYNECK—THE NUTHATCH .	193
XXIV. THE TREE-CREEPERS—THE HOOPOE	200
XXV. THE CUCKOO	204
XXVI. THE SHRIKES	214
XXVII. THE TITMICE	221
XXVIII. THE WREN—THE GOLDCREST	231
XXIX. SWALLOWS AND MARTINS	237
XXX. THE SWIFT—THE NIGHTJAR	248
XXXI. THE BEAK	258
XXXII. THE INSECTIVOROUS BIRDS	264
XXXIII. THE SEED-EATERS	271
XXXIV. SNAKES AND LIZARDS	278
XXXV. THE BATRACHIANS	293
XXXVI. THE TOAD	300

ILLUSTRATIONS

	PAGE
TOOTH OF HORSE	15
HUMAN TEETH	16
TOOTH OF WOLF	20
DENTITION OF WOLF	26
MOLARS OF CARNIVORE	27
DENTITION OF CAT	28
DENTITION OF HORSE	29
SEMI-JAW OF HORSE, REGARDED VERTICALLY	30
DENTITION OF RODENTS	31
DENTITION OF BAT	35
THE BATS <i>(to face)</i>	36
SKELETON OF BAT	49
DENTITION OF HEDGEHOG	62
HEDGEHOG AND VIPER—MOLE—SHREW-MOUSE <i>(to face)</i>	66
DENTITION OF MOLE	82
FEET OF MOLE	89
NEST OF MOLE	93
DENTITION OF SHREW-MOUSE	96
A CRUEL AND STUPID ACT <i>(to face)</i>	100
FEET OF NOCTURNAL BIRDS OF PREY	109
COMMON OR BLACK RAT	115
NORWAY, BROWN OR SEWER RAT	116

	PAGE
WOOD-MOUSE	119
HARVEST-MOUSE	120
FIELD VOLE—BANK VOLE	123
LEMMING	125
HAMSTER	127
GARDEN DORMOUSE	128
TRUE DORMOUSE	129
THE OWLS (to face)	134
OWL SURPRISED BY SMALL BIRDS (to face)	142
FEET OF DIURNAL BIRDS OF PREY	151
DIURNAL BIRDS OF PREY (to face)	156
THE RAVEN AND THE CROWS (to face)	170
WOODPECKERS AND CLIMBING BIRDS (to face)	194
SOME INSECT-EATERS—I (to face)	200
TITS, WREN AND GOLDCREST (to face)	222
SWALLOW, MARTINS, SWIFTS, NIGHTJAR (to face)	238
THE NIGHTJAR'S BILL	255
VARIOUS BEAKS	259
CROSSBILL.	261
SOME INSECT-EATERS—II (to face)	262
SOME INSECT-EATERS—III (to face)	266
SEED-EATING BIRDS (to face)	274
HEAD OF VIPER (SECTION)	280
SNAKES AND LIZARDS (to face)	286
METAMORPHOSES OF THE FROG	296
BATRACHIANS (to face)	296
TADPOLE OF THE SALAMANDER	298

Farm Friends and Foes

I

THE AIM OF THESE TALKS

ONE evening in May Uncle Paul and his nephews were sitting in the garden, under the big elder-tree. Louis was there too: Louis, a constant companion of Jules and Émile since the telling of the story of *The Destroyers*. As the daylight faded, the squealing flights of swifts passed wheeling above the village, now darting toward the belfry, to inspect their nests in the holes and crannies of its walls, and now rising to such heights that they were lost to view. A few bats were fluttering, with irregular flight, round the house, emitting at intervals their faint, short squeak. From the midst of the daisy-covered grass-plots rose the monotonous chorus of the field-cricket, while the song of the mole-cricket sounded in the lettuce-bed like the incessant whirl of a spinning-wheel; and a solitary toad, in his cool, moist cellar under some flagstone, uttered from time to time his flute-like note, while the frogs filled the ditches in the neighbouring meadows with their hoarse croakings.

From one hollow willow-tree to another, the owls called softly, while the lark, with lyric fervour, sang the farewell of evening to his brooding mate, already drowsing upon her eggs.

PAUL.—When I was finishing the story of *The Destroyers* I promised to tell you that of our *helpers*. This seems a good time to keep my word. You have now before your eyes, you can now hear, some of the valued defenders of our crops.

I give the name of *helpers* to those animals which, living apart from us, not under our care, come to our assistance in making war upon grubs, caterpillars, insects and the various devourers, which would in the end become the masters of our crops did not others, besides ourselves, oppose their excessive multiplication. What is man able to do against their famishing hordes, revived year after year in numbers that defy calculation? Has he the necessary patience and skill and keenness of sight to wage effective war, above all on the smaller species, which are often the most formidable, when the cockchafer, despite its size, defeats our best efforts? Can he undertake to inspect his fields clod by clod, his grain ear by ear, his fruit-trees leaf by leaf? The entire human race would not suffice to perform this stupendous task, even if it concentrated upon it the whole of its concerted energies. The voracious brood would starve us, my children, if others did not work for us, others endowed with unvarying patience, skill that detects every ruse

and vigilance that nothing can escape. To keep watch on the enemy, to seek it out in its most secret lair, to pursue it unrelentingly, to exterminate it—this is their sole care, their incessant business. They are persistent and pitiless; hunger drives them to work for themselves and their families. They live upon those that live at our expense; they are the enemies of our enemies.

The swifts that are now wheeling overhead, the bats fluttering round the house, the owls calling one another from the hollow willow-trees in the meadow, the warblers singing in the thickets, the frogs croaking in the ditches, are all taking part in this great task; others too work at it, even the toad, whom the majority of people regard with aversion. We may thank God that he has given us, for the defence of our daily bread, the owl and the toad, the bat, the adder and the lizard! All these abused and calumniated creatures, stupidly persecuted by our hatred and aversion, are in reality our valiant helpers and deserve to be restored to our esteem. I shall not fail to do my duty by them as I tell you the story of each. Blessed be God, who, to protect us against that great devourer, the insect, has given us the swallow and the warbler, the robin and the nightingale. Is there any need that I should defend these most gracious of creatures, a joy to behold and to hear? Alas, yes! for their nests are ravaged by the barbarous nest-hunter.

I propose, to-day, to make known to you these

various helpers of man in his agricultural labours ; I shall tell you of their manner of living, their habits, their aptitudes ; I shall tell you of the service they render us. My object will have been achieved if I contrive to inspire you with a little of the interest which they deserve. I shall begin with those whose mouths are equipped with teeth ; but first of all let us take a general survey of the structure and form of the teeth themselves, for on their form depends the kind of food consumed.

II

TEETH

PAUL.—It is true, is it not, that for every kind of work a specially constructed tool is required? The tiller of the soil must have his plough, the blacksmith his anvil, the mason his trowel, the weaver his shuttle, the joiner his plane; and these different implements, excellent for their proper work, would be worthless for any other task. Can the mason rough-cast walls with a shuttle? Can the weaver weave cloth with a trowel? Obviously not. It is true, is it not, that from the tool we can easily tell the kind of work for which it is intended?

JULES.—It seems to me nothing could be simpler. If I see planes and saws hanging up on the wall I know I am in a carpenter's shop.

ÉMILE.—The hammer, anvil and tongs denote a blacksmith; the mortar-board, trowel and plumb-line, a mason or bricklayer.

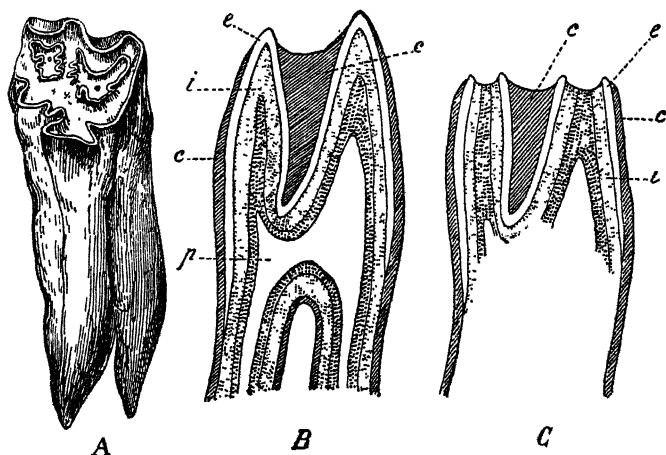
PAUL.—Well, each creature has its special task to accomplish in the great workshop of Creation, in which all things act and labour in accordance with the designs of an all-wise Providence; each species has

its mission ; I might well say, has its special calling ; a trade or craft that calls for special implements, just as does every kind of work performed by human industry. Now, among the innumerable trades of the animals there is one which is common to them all without exception ; a fundamental trade to which all the rest are subordinated, since without it life would be impossible : the trade of *eating*.

But the sort of food eaten differs with different animals. Some require living prey, raw flesh ; others require forage ; for these roots, or grain, or fruits. In any case, the teeth are the implements employed in the work of eating ; they must therefore be formed in accordance with the sort of food devoured, whether tough or tender, difficult or easy to chew. Thus, just as we judge the kind of work performed by an artisan from the implements of his trade, so from the conformation of the teeth we can as a rule declare what sort of food an animal requires.

Those animals are known as *herbivorous* that feed on grass, forage, hay, etc. ; while those that eat flesh are *carnivorous*. Horses, asses, cattle and sheep are *herbivores* ; dogs, cats, wolves are *carnivores*. The food of the herbivore is tough, hard, stringy matter, which the animal has to chew for a long while in order properly to break it up and reduce it to a mouthful of pulp, capable of being swallowed and then digested without difficulty. In such animals the teeth opposing one another in the two jaws must

present to one another wide and more or less plane surfaces, which grind the food like the stones of a mill. On the other hand, the flesh on which the carnivore feeds is a soft substance, easy to swallow and digest. It is enough for the animal to tear it and cut it up into shreds. The teeth of carnivores



TOOTH OF HORSE.

A, Tooth. *B*, Section of a young tooth. *C*, Section of a worn tooth. *e*, enamel; *c*, cement; *i*, ivory; *p*, dental pulp.

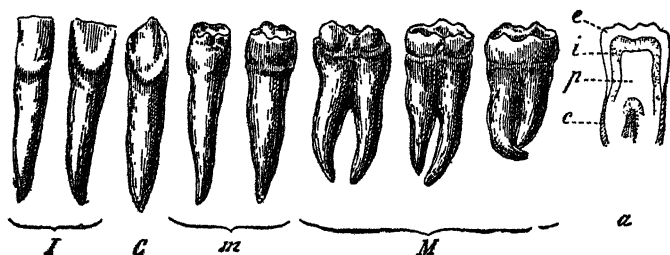
must therefore present to one another sharp cutting edges, which act like the blades of shears.

I think I have told you enough. Now, which of you three can tell me what sort of food to which the teeth I have here are adapted?

And Uncle Paul set before his listeners the two teeth depicted here and on page 20.

ÉMILE.—The first tooth is flat and very wide across

the top; it would crush and grind food by rubbing against a similar tooth opposed to it in the other jaw. So it is the tooth of an animal that lives on forage. The edge is a sharp cutting edge, adapted to chopping up the food, dividing it into tiny fragments. We therefore call these *incisor* teeth, from the Latin *incidere*, which means "to cut." The root is a simple tap-root. The next tooth is called



HUMAN TEETH.

I, incisors. *C*, canine tooth. *m*, pre-molars or bicuspid. *M*, molars. *a*, section of a tooth; *e*, enamel; *c*, cement; *i*, ivory; *p*, dental pulp.

a *canine* tooth. Its root is rather longer than that of the two preceding teeth, and its crown is slightly pointed. The dog, the cat, the wolf, and the carnivorous animals in general have this tooth fashioned into a strong curved tusk which enables them to hold and seize their prey, but, before all, serves the purpose of a weapon of attack or defence. The long, pointed teeth which you see crossing one another, two on either side of the jaw, if you lift the lips of a cat or dog, are the canine teeth. These tusk-like

teeth are very noticeable in the carnivores, especially in the dog, which in Latin is called *canis*; so that we give the name *canine* to the teeth which in man are analogous, if not as to form and function, at all events as to the position which they occupy.

PAUL.—It is, as a matter of fact, the tooth of a herbivorous animal—a Horse.

ÉMILE.—The second tooth consists of several wide points, whose edges are almost as sharp as a knife. It must be intended to cut up flesh.

PAUL.—I should think so: it is the tooth of a Wolf. Émile clearly understands the fundamental distinction between teeth adapted to eating forage and those adapted to eating meat.

JULES.—What is the use of these winding folds that you see on the Horse's tooth? There is nothing of the sort on the Wolf's tooth.

PAUL.—I was going to tell you about them. If the Horse's teeth were perfectly even on top, without any sort of roughness, to act as a rasp, then, when pressed and rubbed against one another, they would certainly crush the hay, as you might crush it between two smooth stones, but they would not be able to reduce it to small fragments, would they? The stones of a flour-mill, if they were polished like marble table-tops, would crush the corn flat without turning it into flour; they must be covered with numerous little grooves and ridges, which grip the grain as the upper stone rotates on the lower, and violently tear

it to pieces. Where, by long use, these roughnesses are effaced the stones can no longer do their work, and have to be re-pointed with a hammer. Well, these grinding ridges on the Horse's tooth are like the irregularities of the millstones; they are slightly raised above the surface of the tooth, so that these slight projections form a sort of coarse rasp which breaks up the bits of forage when the opposing tooth is rubbed against it.

JULES.—It seems to me there might be a danger that these projecting ridges would soon get worn out by rubbing against one another, just as the ridges of the millstone get worn. If the millstones will then make no more flour unless they are re-pointed, the worn teeth of the herbivorous animal will surely grind its food no longer.

PAUL.—That is provided for in a wonderful fashion. Everything in this world is devised, with astonishing art, to attain the proposed end; a knowledge that allows nothing to escape it orders the minutest detail; everything, even to the jawbone of an Ass, tells us this plainly. Listen and judge for yourselves.

In the make-up of a tooth we find two different materials: one, very hard, having something of the nature of glass, is called *enamel*; the other, more readily worn down, but very difficult to break, is the *ivory*. These two substances are combined in different ways according to the animal's diet. In the Horse, the Sheep, the Ox, the Ass, and many other herbivores,

the softer substance, ivory, makes up the greater bulk of the tooth, while the harder material, the enamel, runs in twisted sheets through the thickness of the ivory, projecting slightly outside it in the form of ridges whose shape varies in different species. It is therefore the enamel, a substance as hard as stone, that makes the grinding ridges of the herbivore's teeth. As the one jaw rubs against the other the ivory wears down more quickly than the enamel, so that the sheets of enamel that run through the whole substance of the tooth are gradually uncovered at the edges and restore the worn ridges of the surface to their original state. So you see: in the food-mill of the Ass the millstone re-points itself as required the machine repairs itself while it works.

JULES.—What you tell us, Uncle, is wonderful; I should never have suspected that such a structure was necessary to cut a thistle!

LOUIS.—And I, the other day, contemptuously kicked aside a jawbone that lay in my path. How gladly I would have examined it if I had known these things!

PAUL.—Ignorance is always like that, my boy; it rejects and despises everything; knowledge is interested in everything, being certain of learning something from it. But let us return to the jaw of the carnivorous beast, the Wolf.

Here the asperities of the rasp, the ridges of the file, the corrugations of the millstone are useless, for

the food has to be cut up into shreds, not ground into pulp. For this sharp cutting-edges are needed, shears, which must before all be well sharpened and so hard that they will not grow blunt. The surface of the teeth, accordingly, is no longer flat like a mill-stone, but fashioned into wide sharp-edged ridges. Moreover, to ensure the efficacy of these knives, as



TOOTH OF WOLF.

a, tooth; *b*, section of tooth; *e*, enamel;
c, cement; *i*, ivory; *p*, dental pulp.

we may call them, the softer substance, which is none the less harder to break—the ivory, in short—here constitutes the central mass of the tooth, while the enamel, harder but also more brittle,

forms a continuous outer coating, and of this alone consist the cutting edges. Just as a skilled cutler, if he wants to make an implement that will cut anything easily and will also be able to resist violent efforts, will make the central mass of the implement of iron, a tenacious material which readily endures sudden stresses, but is not hard enough to cut, and lays over it, to make the cutting edge, a fine steel that combines extreme hardness with the brittleness of glass. That which human industry has devised for the purpose of cutting we find in great perfection in the teeth of a carnivore.

JULES.—If I understand you, the ivory, softer but less easily broken, forms the interior of the carnivore's tooth; the enamel, harder, but brittle, forms the outer coating; so that the ivory gives the tooth the strength to resist effort while the enamel enables it to cut.

PAUL.—That is it, precisely.

JULES.—I don't know which of the two is the more wonderful, the jaw of the Ass or the Wolf's jaw.

PAUL.—Both are wonderful, since both are marvellously adapted to the kind of work which they have to perform.

ÉMILE.—What surprises me most is that a lot of things to which we should never have given any attention interest us as soon as uncle explains them. I should never have thought I should one day be so glad to hear the story of a tooth.

PAUL.—Since it interests you I will tell you a little more. I will tell you something about the teeth of man; about your teeth, my boy, so white and even, which bite so well into a slice of bread and jam!

III

VARIOUS FORMS OF TEETH

PAUL.—Man has thirty-two teeth, sixteen in each jaw. —Émile already had a finger in his mouth, moving it from one tooth to the next, in order to count them. His uncle waited while he did so.

ÉMILE.—But I've only twenty, altogether ; twenty, not thirty-two.

PAUL.—The twelve you haven't got will come along one day, my boy ; for the moment you have the number of teeth proper to children of your age. The fact is, they don't come to us all at once, but one after another. We begin by having not more than twenty. They are known as *milk teeth*, or teeth of the *first dentition*. About the age of seven they begin to fall out, and are replaced by other teeth, stronger and more firmly rooted. Besides these, twelve new teeth grow, which bring up the number to thirty-two. The more distant, right at the back of the mouth, come fairly late, at eighteen, or twenty, or later ; so we call them *wisdom teeth*, which means that they appear at an age when the mind is rational. These thirty-two final teeth constitute the *second*

dentition. I call these final because they are never replaced by others ; if we happen to lose them that's the last of them ; they don't come again.

ÉMILE.—I've got two now that I can move.

PAUL.—Soon they will have to be pulled out to make room for the new teeth that will replace them. The others will come out in the same way, and the twenty teeth you have to-day will make way for twenty others, which sooner or later will be completed by twelve more, that come only once ; these occupy the further part of the jaws, three on either side, above and below ; so the final number will be thirty-two.

These thirty-two teeth are divided into three classes, according to their form and their function. The same teeth occur in both jaws, right and left, so I shall show you only the eight teeth from one half of one jaw. In every tooth two portions may be distinguished : the *crown* and the *root*. The root is that part of the tooth which is buried in the jawbone like a nail driven into wood ; the crown is the part that protrudes ; you may compare it to the head of the nail. The root holds the tooth in place, and fixes it firmly ; the crown cuts, tears or grinds the food.

The two teeth in the front of either half of the jaw have the crown thinned obliquely from the base to the summit. The five succeeding teeth are the most useful of all. They are called *molars* (from *mola*, a millstone) because they act as millstones for

grinding food. For this purpose they have broad crowns ; these crowns, too, are slightly uneven ; not flat as in the molars of the Horse, nor yet formed into sharp plates as in the molars of the Wolf, since the food of man does not consist exclusively either of vegetables or of flesh, but of both together. For a diet as varied as that of man molars are needed adapted for all uses ; they must grind like those of the herbivores and cut like those of the carnivores ; in short, they must, in their structure, be midway between these two forms. As a matter of fact, in their broad crowns they are adapted for vegetable diet, and in their fairly sharp irregularities to animal food.

The first two of these teeth are known as *pre-molars* (or bicuspid). They are the least powerful, and have only a single root. The two pre-molars, the canine and the two incisors are the only teeth that are renewed. Multiply them by four and you have the twenty teeth of the first dentition : teeth which begin to fall at the age of seven or thereabouts and are gradually replaced by others. For the time being Émile's teeth include only these twenty.

The other three grow only once. They are known as *molars*. The last, on the right of the figure, is the *wisdom tooth*. As the large molars have to support a very great pressure when we eat, the root consists of several prongs, each of which is sunk in a special cavity or socket. This arrangement is evidently

intended to multiply the points of support, to strengthen the molars and prevent them either from breaking or driving each other, by their mutual pressure, into the body of the jawbone.

To sum up : An adult man has in all 32 teeth, 16 in either jaw, namely : 4 incisors, 2 canines and 10 molars. These latter are divided into 4 premolars and 6 molars ; the first dentition does not contain these last molars.

JULES.—Are the ivory and enamel, those two substances of different hardness, which are so remarkably arranged in the teeth of the Horse and the Wolf, to be found also in human teeth ?

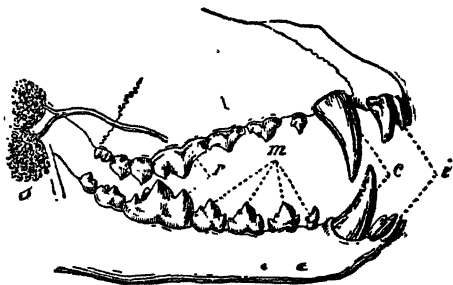
PAUL.—They are to be found in them too. The whole of the root, whose purpose is to serve as an immovable support, is of ivory ; and the interior of the crown too is of ivory, while the enamel provides the exterior of the crown with a harder protective coating.

ÉMILE.—I am going to find the cat, to look at her teeth. Has she twenty, like me, or thirty-two ?

PAUL.—Neither twenty nor thirty-two, but precisely thirty, when she is full-grown. The Dog and the Wolf have forty-two ; the Horse and the Ass, forty-four ; in fact the number varies just as the shape does, from one animal species to another. Perhaps it would not be out of place to tell you a little about this.

Here, to begin with, is the mouth of a Wolf. If we did not already know it a mere examination of the

teeth would enable us at once to guess the animal's diet. It must be a tough sort of prey that calls for these strong molars, and the powerful fangs of the canines. This is a set of teeth that betrays an obviously carnivorous appetite. The teeth marked *i* are the incisors; there are six of them. They are small, and are not of very much use, for the animal does not chop its prey into mincemeat, but swallows



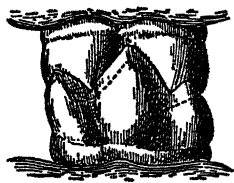
DENTITION OF WOLF.

i, incisors; *c*, canines; *m*, pre-molars; *r*, molars; *s*, salivary glands.

it in large shreds. At *c* are the canines; regular daggers, which the bandit buries in the throat of the sheep. At *m* are the pre-molars. The molars follow. The first, *r*, is the strongest, and is known by the significant name of *flesh-tooth*. It is with their flesh-teeth that the Dog and Wolf crack the hardest bones. Lastly, the drawing shows the *salivary glands*, that is, the organs which prepare the saliva and allow it to flow into the mouth through the duct *s*, while the animal is eating. Without dwelling on this point—

which would lead me too far from my subject—I may tell you that the saliva serves to moisten the food so as to make a soft mouthful which is easily swallowed; it also helps, in the stomach, to reduce the food to a fluid broth, that is, to digest it.

Let us now consider the Cat, who is, like the Wolf, essentially a flesh-eater. Six small incisors at the front of the jaw form, as it were, a row of neat but useless pearls. They are ornaments rather than implements. The huntress of mice must have long, very sharply pointed canines, to stab the prey caught in her claws. The Cat has formidable weapons for this purpose. What do you think of them, Louis?



MOLARS OF CARNIVORE.
(Flesh-teeth.)

LOUIS.—I think the rat can't be very comfortable between the tusks this picture shows.

ÉMILE.—One day when I pulled her whiskers our Cat gave me a bite that was like a very bad prick from a needle. It was done so quickly I hadn't time to pull my hand away.

PAUL.—The Cat made use of her canines; she wounded you with one of them as smartly as with a sharp steel point.

Now look at the molars. There are four above and three below. Their crowns are even harder and sharper than the molars of the Wolf; for the appetites

of the Cat and its congeners, the Tiger, Panther, Jaguar and so forth are even more bloodthirsty than those of the Wolf and the animals related to it, such as the Fox, the Jackal and, above all, the Dog. Have you noticed how disdainful the Cat is if you throw her a mere crust of bread? She barely smells it, and turns away with superb disdain, her tail high, her back arched, and looks at you as though to say: "Are you insulting me? That's not what I need!"

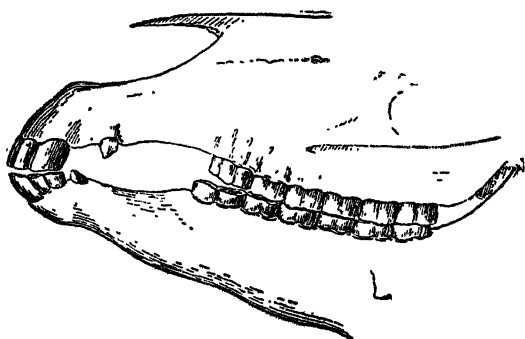


DENTITION OF CAT.

Certainly, if pressed by hunger she will eat the bread, regretfully, chewing it awkwardly and swallowing it with difficulty. The Dog, on the other hand—our good Azor in particular—catches the bread thankfully, before it falls to the ground, and if he has any complaint to make it is only that the piece is too small. You say of the Cat that she is dainty. I will defend her by saying that she is nothing of the kind; her apparent daintiness is a fatal necessity, due to the conformation of her teeth. What can her pointed canines, her molars, do with a crust of bread? They need before all things a bleeding prey with quivering flesh.

What a difference between the teeth of this bloodthirsty hunter and those of the peaceful grass-eater! Let us look at this Horse's head. The incisors, six

in number, are now powerful teeth ; they seize the forage and crop it mouthful by mouthful. The canines, here useless, show only a slight projection above the jawbone. Beyond them is a wide gap known as the *bar* ; it is there that the bit lies when the horse is bridled. After the bar comes a regular grinding-machine, composed of twelve pairs in all of



DENTITION OF HORSE.

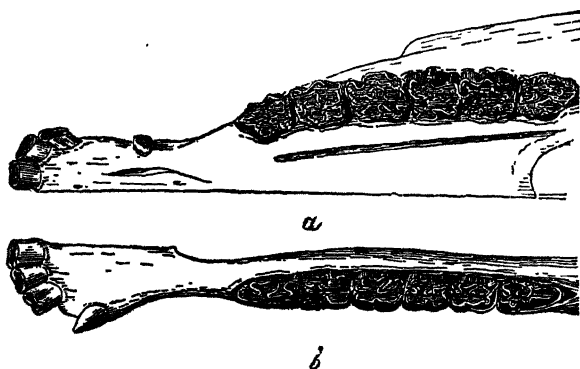
strong molars, with flat, square crowns, equipped moreover with slightly projecting sinuosities, to whose great usefulness I have already called your attention. If I mistake not, we have here a mill capable of grinding tough straw and stringy hay.

Finally, here is a Rabbit's skull. Either jaw is equipped with two enormous incisors which are buried deep in the bone, curving backwards outside the jaw and ending in a sharp cutting crown. What can be the purpose of such incisors ?

JULES.—I can tell you. The Rabbit is always

nibbling. If it has nothing better it will nibble bark and even wood. It uses its incisors to chop its food very fine—to gnaw it.

PAUL.—Gnaw—that's the word! So the different animals that have such incisors are called *rodents*. Such are the Squirrel, the Hare, the Rabbit, the Rat and the Mouse; for the most part miserable species that are fated to be continually gnawing at



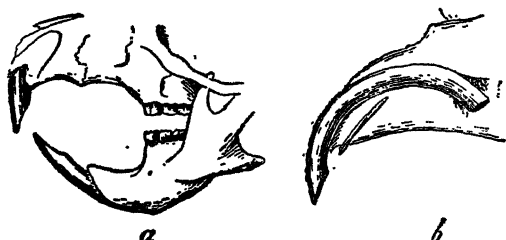
SEMI-JAW OF HORSE, REGARDED VERTICALLY.

a, upper jaw; *b*, lower jaw.

the toughest vegetable substances, filling their stomachs with wood, paper or rags when there is nothing better to put into the mill, which has always to be working. It is not only to satisfy hunger that these animals are almost incessantly gnawing; another need impels them to gnaw. Their incisors continue to grow all their lives and tend to increase in length indefinitely; so that the animal has to wear them down by continual friction, or their crowns would grow away

from one another so that sooner or later they would no longer be able to meet. Unable thenceforth to seize its food the poor beast would perish. If they are to be able to eat when hungry the Rat and Rabbit must eat even when they are not hungry, in order to sharpen their incisors and keep them the proper length. It is true that at such times they turn to substances that are scarcely nourishing.

A splinter of wood, a bit of straw, anything almost



DENTITION OF RODENTS.

a, teeth of Hamster ; *b*, upper incisor of Rabbit.

suffices to keep their indefatigable incisors at work. Keep in mind this expressive name of *Rodents*, by which we denote a whole category of animals analogous to the Rabbit and the Rat ; remember their curious incisors ; we shall have occasion to return to them later. For the moment let us complete our examination of the Rabbit's teeth.

The canines are wanting ; in their place the jaws show a *bar*, that is, a wide blank interval. Right at the back of the mouth are the molars, few in number, but strong, with flat crowns, armed with a few folds

of enamel. On the whole they make an excellent grinding-mill.

By giving you these few details as to the formation of teeth, which varies so greatly in different species, I wanted more especially to establish the following truth: Each species is addicted to a particular kind of nourishment, for which the teeth are expressly designed, so that, one might say to an animal, "Show me your teeth and I'll tell you what you eat." Very often, as a result of deficient observation, we do not know what this or that animal feeds on, and in our hasty judgments we confound the enemy with the friend, the destroyer with the helper. If the beast is disagreeable to our senses we award it our hatred without fuller examination; we accuse it of a host of misdeeds and declare pitiless war upon it, never guessing, in our stupidity, that we are really making war upon ourselves. Yet a very simple precaution would enable us to avoid such regrettable confusion. Let us pay no attention to prejudice, however general it may be, but before condemning an animal as harmful let us consult its teeth. They will tell us what sort of a life the creature lives. The following example will convince us of this.

IV

THE BATS

PAUL.—Now, if you please, on what do the Bats feed? Which of you three can tell me?

At this query of Uncle Paul's, Émile seemed to be consulting his memory, closing his eyes and scratching his head; but nothing occurred to him. Jules and Louis, too, had nothing to say.

PAUL.—None of you knows; all the better, for you will have the satisfaction of discovering the answer for yourselves, from the form of its teeth. Now, look carefully at this drawing, which shows, larger than life, the teeth of a Bat. The incisors which you see in the lower jaw are very small and feeble. Are they made to gnaw vegetable substances like those of the rat and the rabbit? Could they cut through the tough and stringy food of those animals?

JULES.—They certainly could not: they are too weak to be of much use. And then these two sharp tusks, it seems to me, must mean a carnivorous animal.

PAUL.—The long pointed canine teeth certainly mean that, but the molars, perhaps, tell us the same thing even more plainly. With their strong jagged

cutting-edges, fitting so closely the recesses in the opposite jaw, can these molars be intended to grind grain or patiently bray stringy substances ?

JULES.—No. This is the mouth of a carnivore, not the grinding-machine, the mill, of a herbivore.

LOUIS.—Yes, I'm sure of it now : the Bat feeds on living prey.

ÉMILE.—It's a hunter, a bloodthirsty creature. The Cat's teeth are not so ferocious-looking as these !

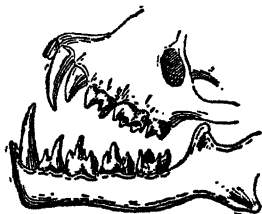
PAUL.—That is all quite correct ; the teeth have told you plainly the chief point about the creature's habits. Yes, the Bat is a hunter, a devourer of living prey, a tiny ogre that must always have fresh meat. Now it remains to learn what sort of game it requires. Evidently the size of the prey must be in proportion to the size of the hunter. The head of the Bat is hardly bigger than a large hazel-nut. The mouth, it is true, goes from ear to ear, and could, when wide open, take a mouthful from whose size you would never guess the small proportions of the animal. None the less, the Bat can attack only very small species. What can it hunt in the air when after sunset it flutters to and fro, constantly coming and going ?

JULES.—The flies, perhaps, or the night-moths ?

PAUL.—Just so ; they are its prey. The Bat feeds only on insects. All are welcome to it : beetles with hard wing-covers, skinny gnats, tender butterflies, and above all the many moths that fly of an evening :

clothes-moths, oak-eggers, *Phalenæ*, *Pyrales* and others; those, in short, that ravage our corn, our vines, our fruit-trees, our woollen stuffs; which, attracted by the light, come by night to burn their wings in the lamps of human dwellings. Who can tell the number of insects which the bats destroy as they go their rounds about a house! The game is so small and the appetite of the hunter is insatiable.

Note what happens on a calm summer evening
Called forth by the mild
warmth of the twilight hours,
a host of insects appears,
leaving their retreats and
gathering, guests at the festival
of life, to sport together
on the breeze, to seek their
food and their mates. This



DENTITION OF BAT.

is the hour when the sphinx-moths fly suddenly from flower to flower, to plunge their long probosci into the honeyed recesses of the flowers; the hours when the gnat and the mosquito, thirsting for the blood of man, sound their battle-cry in our ears and select the tenderest spot into which they can strike their poisoned lances; the hour when the cockchafer deserts its leafy shelter, spreads its humming wings and roams the breeze in search of its fellows. The midges dance in joyous bands which the slightest breath of air wafts aside like a cloud of smoke; the *Phalenæ* and the clothes-moths, all in their wedding

garments, their wings powdered with silver dust and their plummy antennæ outspread, disport themselves or seek favourable spots in which to deposit their eggs; the Scolytus emerges from his corridors under the bark of the elm-tree; the Calender bursts open the cell hollowed out of a grain of wheat; the Alucitæ rise in clouds from the heaps of ravaged grain and wing their way to the fields of ripe corn; while the Pyrales explore, here the vine-leaves, there the pear- and apple- and cherry-trees, all busy to make sure of food and shelter for their disastrous progeny.

But in the midst of these junketing populations a shadow suddenly appears. It is the Bat, which, with tortuous flight, comes and goes, indefatigable, rising and falling, appearing and disappearing, darting hither and thither, and each time snapping up an insect on the wing, which is instantly broken up and swallowed. The hunting is good. Midges, beetles and moths abound; from time to time a little squeak of joy announces the capture of a fat moth, and as long as the fading light of evening permits the ardent hunter thus pursues its work of extermination. Replete at length, the Bat regains some quiet and sheltering retreat. On the following day, and all through the summer, the same chase is repeated; always as eager, always at the expense of insects only.

To give you some idea of the number of ravagers, and above all of night-moths, from which the Bats deliver us, I will quote the following passage from



THE BATS.

a, Long-eared Bat. *b*, Greater Horse-shoe Bat
d, Noctule. *e*, Pipistrelle (ear). *c*, Sérotine.

To face p. 36.

Buffon, the famous French naturalist, who writes in such eloquent fashion of animals. I must tell you that Bats are accustomed to retire in great numbers to old towers, caves or abandoned quarries. There they pass the hours of broad daylight, hanging motionless from the roof, to merge at the fall of night. The ground, in these retreats, becomes covered, in time, with a thick layer of dejecta, which enables us to discover the kind of food consumed by the Bats, and the importance of their work as hunters. This is what Buffon says of a cave haunted by Bats :

“Having one day gone down into the caves of Arci, I was surprised to find there a kind of mould, of a singular nature. It was a layer of blackish matter, several feet in depth, almost wholly composed of portions of the wings and legs of flies and moths, as though these insects had resorted thither in immense numbers there to perish and rot together. It was no other than the dung of the Bats which had collected there for years.”

JULES.—What a curious sort of mould, made entirely of scraps of insects !

PAUL.—I may tell you that this mould made of flies and moths is often so plentiful in the depths of old quarries and caves that the farmers value it and use it as a very rich manure : they call it *bat guano*.

LOUIS.—But to make such deposits the Bats must destroy millions and millions of insects ?

PAUL.—Sixty or seventy flies or moths will hardly

suffice for a Bat's supper ; if a few cockchafers turn up too the Bat will gladly snap them up. If the band of hunters is numerous you may judge of the number of ravagers destroyed in a season. After the birds, we have no more valiant helpers than the Bats ; so I can give the best of characters to these valuable creatures, which, while we are sleeping, and dreaming perhaps of our fruit and corn and grapes, are silently waging a war of extermination upon the enemies of our crops, and destroying, night after night, myriads of cockchafers, Phalenæ, Tineæ, Pyrales, Looper-moths—in short, the greater number of those species that are always threatening to starve us if others than ourselves do not keep on the alert.

ÉMILE.—The Bat, I can see, does us very great service ; all the same, it is very ugly, and they say that its touch gives one the itch.

PAUL.—They say many other things too, my boy. They say the Bat, with its sharp teeth, bites the udders of goats, in order to suck both milk and blood ; they say it gnaws the sausages and bacon hanging in the chimney ; they say, too, that its sudden entry into a house is a presage of misfortune. I have known people shriek aloud because a Bat brushed them with a wing-tip ; I have seen them terrified and pale with fear because they had found the innocent creature hanging by one leg from the window-curtains.

Here, my dear boys, as in many other matters, we must make a large allowance for human imbecility,

to which error is more familiar than truth. If you were old enough to understand me, I would add that when people are agreed that a certain thing is black it is a wise plan to make sure, first of all, whether by any chance it isn't white. We are so stuffed with false ideas that very often the truth is the exact opposite of the common belief. Shall I give you some examples? There are plenty of such.

The sun, we say, as a rule, going by mere appearances, revolves from east to west round a motionless earth. No, says the scientist, the man who examines things in a rational manner; no, on the contrary, it is the earth that revolves from east to west in front of a motionless¹ sun.—The stars, we say, are little shining specks, candles lit in the vault of the sky. No, replies the scientist; no, the stars are not mere twinkling lights; they are enormous heavenly bodies, in size and radiance often greater than the sun itself, which is one and a half million times greater than the earth.—The Bat, so people are given to repeating, is a maleficent beast, hideous, poisonous, of evil omen, a thing to crush pitilessly under one's heel. No, says the scientist, a thousand times no; the bat is an inoffensive creature, which, far from doing us any harm or foretelling misfortune, renders us an immense service in safeguarding the riches of the earth against their innumerable destroyers. No, we must not feel hatred for it and pitilessly kill it; we ought on the

¹ Motionless relatively to the earth's orbit.

contrary to esteem and respect it as one of our best auxiliaries. No, the poor creature does not deserve the dismal reputation which ignorance has given it ; its touch does not give us either lice or the itch ; its teeth do not wound the teats of the goat or spoil our stores of bacon ; its accidental entry into a room is no more to be feared than that of a butterfly. Quite on the contrary, I myself wish the Bat would often visit my room of an evening ; I should soon be rid of the gnats that bother me. All things considered, we have nothing, absolutely nothing with which to reproach the Bat, and we have to thank it for very important services. This is what rational examination replies to the prejudice of ignorance. Henceforth crush the Bat beneath your heel if you dare !

LOUIS.—I shall take good care not to do so now that I know what a host of enemies the Bat saves us from !

JULES.—It is a pity it's such a hideous thing.

PAUL.—Hideous ! That's a strong expression which I hope I shall persuade you to take back.

JULES.—No one can deny that the Bat is frightfully ugly.

PAUL.—Perhaps one could.

ÉMILE.—I should like to know how such a hideously shaped creature could be called beautiful.

PAUL.—Well, my boy, I shouldn't find it easy to discuss the question of beauty and ugliness with you ;

to do so thoroughly would call for a mental maturity greater than your own. Even if you were grown up we might still find it impossible to agree, for beauty and ugliness must be judged not with the eyes of the body, but with those of the mind, acquired by reflexion and study, and freed from the fetters of first impressions, which are commonly infected by error. Alas ! how few possess that keen intellectual sight which has this power to silence frivolous and superficial opinions and to contemplate things in the serenity of truth ! If we go by the mere evidence of our eyes, fortified in us by daily habit, we call those creatures beautiful whose general structure displays a certain conformity with that of the animals which are most familiar to us, and have furnished us with our earliest ideas, which are henceforth our standard of judgment. We call those creatures ugly that depart in their form from the usual ; if the difference is great we call them hideous. Reason oversteps the narrow circle of our first impressions ; it rises above petty and shallow appreciations, reminding itself : “ Nothing is ugly that comes from the hands of God ; all things are beautiful, all are perfect in themselves, since all are the work of the Creator, of sovereign Beauty and Perfection.”

We must not judge the form of an animal by its greater or less resemblance to the forms which are familiar to us and serve us as terms of comparison, but rather by its aptitude for the kind of life for which

it is created. Where the structure is in perfect harmony with the functions to be performed, there is beauty. From this higher standpoint nothing is ugly. —I am wrong; many things are, but only in the moral world. Intemperance, sloth, stupid pride, vice—these are really ugly, truly hideous. But this, in very truth, is the only ugliness I know. Why cannot I lift you at one step, my dear boys, to those heights from which the mind takes pleasure in the infinite variety of beings, finding in each creature fresh food for admiration; why cannot I steal a march upon age and open for you, here and now, the treasures of knowledge to which you will one day help yourselves, I hope, with all the ardour that I am now trying to awaken! You will see, then, how the imaginary ugliness grows less and vanishes to give place to a real perfection.

Now I will return to the Bat; if not in the hope of making you think it beautiful, at least in the certainty of interesting you in its remarkable structure. I will wager, to begin with, that none of you knows precisely what a Bat is!

ÉMILE.—It's a bird.

JULES.—It's an old rat that has grown wings.

PAUL.—Now you are both talking nonsense. That's the sort of thing we all of us do. We talk absolutely at random about men and beasts, awarding this one our respect and that our disdain, without knowing what they are, what they are doing, or what they

are worth. You don't know the first word of the story of the Bat, yet you smother the poor beast with insulting epithets.

The Bat has nothing in common with the birds, having neither their beak nor their feathers ; nor is it a rat which has, toward the end of its life, acquired wings. It is absolutely a special creature, which is born, lives and dies with wings, and is not in any way related to the birds. Its body is about the size of a mouse, and the shape of this body, and the skin that covers it, are not unlike those of the mouse ; its wings are naked, whence the French name of the creature—*chauve-souris*, or “ bald mouse.”

The more perfectly organized animals have the distinctive sign of teats or nipples, which yield milk, the first food of their young. These animals do not feed their young as the birds do ; nor do they abandon their offspring to the chances of good or evil fortune, without the least care for their future, as do the stupid races of the fishes and the reptiles ; they rear them with maternal care, with incomparable tenderness ; for some time they nourish them with the milk of their *mammary glands*, or *suckle* them, as we say. Of all the species which give milk to their young, of all the species provided with mammary glands, the scientists have formed a group which they call the *class* of the *mammifers*.¹ I may remark that

¹ From the Latin *mamma*, teat, udder, breast ; *fero*, I bear.

these animals have, in the vast majority of cases, bodies covered with fur, with hair, not with feathers or scales. Feathers belong to the birds; scales to the reptiles and the fishes. As examples of mammals our domestic animals—the Cow, the Dog, the Cat, the Sheep, the Goat, and others—will no doubt occur to you.

ÉMILE.—I have noticed how carefully our cat rears her family. While the little kittens knead her body with their tiny pink paws, as though to make the milk flow more easily, the cat washes them with her tongue, purring gently to express her pleasure.

PAUL.—Well, the Bat is a mammifer or *mammal*, just as truly as the cat; like the cat's, its body is protected from the cold by fur and it has teats to give milk to its young. The number of teats varies greatly from one animal species to another, being greatest in the species whose family is most numerous; as must be the case if all the young ones are to feed at once. The female Bat has only two, placed on the chest, not under the belly. She brings forth and rears only one little bat at a time. Émile, with reason, admires the cat's love for her kittens; but the Bat is an even tenderer mother. When she goes forth of an evening to seek her food, instead of leaving her suckling in some cranny of the wall, having given it its fill of milk, she carries it with her, clinging to her breast, and it is weighted by this burden that she pursues the fast-flying moths on the wing. Her

hunting is undoubtedly less fruitful and more laborious, but no matter ; the affectionate mother prefers not to leave the feeble little creature for a single moment, so it continues quietly to suck while she wheels and flutters in chase of her prey. When darkness falls the Bat returns to her lair, hangs herself from the roof by one claw, and supports her nursling by wrapping it in her folded wings.

JULES.—That is rather nice of her, isn't it ? Already I begin to think the Bat isn't so ugly !

PAUL.—I've told you : ugliness is the child of ignorance, and grows less as knowledge increases. But I've more to tell you.

V

THE WINGS OF THE BAT

PAUL.—The wings of the Bat, so perfectly adapted for flying, are its most striking feature. How can a mammifer, that is, an animal whose general structure is that of the Dog and Cat, for example, contrive to fly like a bird? By what curious provision are two organs united which seem to exclude one another—the wing and the mammary gland? In the Bat's wings we have a wonderful example of the infinite resources employed by the Creator, who, without erasing anything from the fundamental plan, has modified and arranged the same things to perform the most diverse functions. The fore-paws of the mammifers, of the Dog or Cat if you like, in the Bat are changed into wings, without a single part being lost or added in this incredible transformation. What is more, the human arms—our arms, yours or mine—are found there, part by part, bone for bone. You are all looking at me with an incredulous air as though you couldn't understand how there could be anything in common between our arms and the wings of the Bat.

JULES.—The fact is that it needs all the confidence

I have in what you say to make me admit that a man's arm and a bat's wing are really, at bottom, of the same construction.

PAUL.—I don't suggest that you should admit it because you have confidence in me ; I mean to prove it. Follow what I tell you on your own arm, the better to grasp my demonstration.

From the shoulder to the elbow the human arm is composed of a bone which is called the *humerus*. From the elbow to the wrist it comprises two bones of unequal size, lying side by side. The larger is the *cubitus* ; the slighter is the *radius*. Then comes the wrist, composed of several bones, of which I will not speak in detail. Beyond the wrist is the palm of the hand, consisting of a row of five bones, all very much alike, each of which serves to support a finger. Lastly each finger consists of a series of little bones known as *phalanges* : the thumb contains two, the rest of the fingers have three apiece. I should add that two bones serve to attach the arm to the body ; one is the *scapula*, or shoulder-blade, a wide, triangular bone, situated in the back, behind each shoulder ; the other is the *clavicle* or collar-bone, a slender, curved bone which runs from the shoulder to the rise of the throat. Those are the collar-bones or clavicles which you can feel with your fingers, right and left, right at the top of your chest.—While he thus enumerated the parts of the human arm, Uncle Paul guided his listeners' hands so that

they could feel, in their own bodies, the bones which he named. Emile was rather astonished by those learned words—*humerus*, *cubitus*, *scapula*—which he heard for the first time ; but no matter, with attention he could easily remember them. When each was sufficiently familiarized with the name and position of the bones, Uncle Paul continued :

PAUL.—Now let us all look at this picture, which shows the skeleton of a Bat. The bone marked *s* is the scapula. As in our own bodies, this forms the back of the shoulder ; it is triangular, wide, and flat.

ÉMILE.—Then the point marked *cl* is the shoulder, and the bone that runs from this point to the base of the throat is the clavicle ?

PAUL.—That's it

LOUIS.—I can make out the rest ; *h* is the humerus, and the elbow is the joint between that and the next bone.

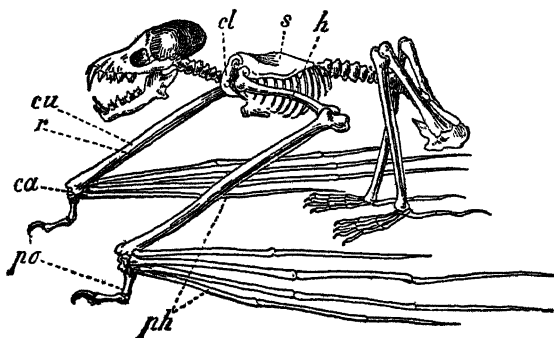
JULES.—Now it's my turn.—The two bones lying alongside one another, which run from the elbow to the wrist, are marked *cu* and *r*. The first is the cubitus, the second the radius. So *ca* must be the wrist. There I begin to lose my bearings.

PAUL.—The wrist, as I told you, is composed of a number of little bones. Some arrangement of small bones is certainly required at *ca* ; it is the bat's wrist.

JULES.—But the hand, then ?

PAUL.—The palm of the hand and the five fingers which it supports are represented by the spokes or

radii of the wing, and by *po*, which is the thumb. The thumb, as in man, is the shortest of the five fingers ; it does not enter into the framework of the wing, but remains free, and is armed with a hooked nail or claw, which the Bat uses for clinging to supports and in walking. Preceding the claw there are two phalanges, as in the human thumb ; and these two phalanges have as their base a little bone which in



SKELETON OF BAT.

s, scapula ; *cl*, clavicle ; *h*, humerus ; *cu*, cubitus ; *r*, radius ; *ca*, carpus ; *po*, thumb ; *ph*, phalanges.

man forms part of the palm of the hand. So much for the thumb.

You see these four very long bones which start from the wrist, *ca*, like the ribs of an umbrella, and occupy the greater part of the wing. Together with the analogous but very much shorter thumb they represent the series of five bones of which the palm of the hand is composed. Beyond them come the fingers, with their phalanges, *ph*. On the whole, apart from some

very trifling differences, the wing of the Bat reproduces, part by part, the framework or skeleton of the human hand and arm.

JULES.—Yes, there's everything there, down to the little bones of the wrist and the fingers. To think that a wretched Bat should have modelled itself on us so exactly! The ugly creature has copied our arms and hands to make itself wings!

PAUL.—Your self-respect need not suffer from this close resemblance, which you will find, in varying degrees, in a host of other animals, above all in the mammifers, our nearest relations in the matter of organization. Man, as regards the structure of his body, has nothing that he can call his own; the Dog, the Cat, the Ass, the Ox, all share with us a common foundation of organs, modified in detail and appropriate to the kind of life peculiar to each species. We recognize the fundamental plan of our arms in the wings of the Bat; we recognize it no less plainly in the fore-limbs of the Cat, the Dog and many others; we may perceive a shapeless attempt at the hand even in the clumsy hoof of the Ass. I tell you these things, my boys, not to diminish in your eyes the incontestable superiority of man, but to inspire you with pity and sympathy for the animal which, constructed like ourselves, suffering like ourselves, is too often the victim of our stupid brutality. He who without motive causes suffering to animals commits a barbarous action; I may truly call it an inhuman

action, for he tortures flesh that is akin^a to our own, he abuses a body which shares with us the same vital mechanism and the same capacity for suffering. As for our superiority, it is affirmed above all by one exceptional characteristic, which places us beyond all comparison with the creatures which in their structure approach us most nearly. This characteristic is the reason, a torch that guides us in the search for truth ; it is the human mind alone which is conscious of itself, and which, by a sublime privilege, has knowledge of its divine Author.

In the Bats, four of the five bones composing the palm of our hand are enormously prolonged, as are the corresponding fingers, forming four spokes or ribs, between which the membrane of the wing is stretched just as the silk of an umbrella is stretched over the ribs. The wing, therefore, is formed principally by the hand. To recall this fact the naturalists have called the whole group of mammals resembling our Bats by the name of *Cheiroptera*,¹ which means *hand-wings*.

Of the five digits one only, the thumb, remains free, and is in nowise of exaggerated proportions ; it is, moreover, equipped with a nail or claw. The four other digits, which have no nails, are prolonged to serve as a support for the membrane of the wing. This membrane is a fold of skin which starts from the shoulder, spreads itself between the four long fingers

¹ Pronounced *kyroptera* ; from the Greek *cheir*, hand ; *pteron*, wing.

of the hand, and is joined on to the hind limbs, whose five digits, all armed with nails curved into hooks do not depart from the ordinary formation. Thanks to the free thumbs, the wings serve as legs when walking, once their membrane is furled and pressed against the animal's sides. The Bat obtains a purchase on the ground by digging into it, by turns, first the right-hand and then the left-hand thumbnail, and pushing itself forward with the hind feet, in a series of laborious jerks. The Bat can crawl in this fashion so swiftly that we may call its gait a run ; but this form of exercise very soon tires it, and it undertakes it only when in the complete security of its own retreat, or when compelled to do so, situated on a flat surface which gives it no opportunity of spreading its wings and taking flight. At such times it will gain as quickly as possible some elevated point from which it can launch itself. In order to unfurl this embarrassing wing-membrane and launch themselves into the air the Bats need a considerable empty space, which they can obtain only by dropping down from above. Thus, in the caves which they inhabit they never fail to provide for an easy fall. With the hooked claws of a hind foot they cling to the roof, head downwards. In this position they rest ; in this they sleep. At the slightest alarm the foot releases its hold, the wings outspread themselves, and the animal flies away.

ÉMILE.—What a funny way of sleeping, to hook oneself to the ceiling by one foot, head downwards !

And do they remain long like that, without getting tired ?

PAUL.—If need be, quite half the year.

And at bed-time, Émile was still thinking about the Bat's way of sleeping ; for his part, he preferred his own !

VI

THE SCENT AND HEARING OF THE BAT

PAUL.—The Bats are nocturnal ; that is, they leave their retreat only at the approach of night, to go hunting in the dusk. In general, the animals which indulge in nocturnal hunting have very large eyes, which collect as much light as possible, thus enabling them to see in comparative darkness. Of this those birds of the night, the Owls, will presently give us a remarkable example. By a singular exception, despite their nocturnal habits, the Bats have very small eyes. How then do they steer themselves in their flight, so rapid and so suddenly varying its direction ; and how, above all, do they become aware of the presence of their small game, the moths and midges ?

They are guided principally by the senses of smell and hearing, which in them are uncommonly keen. What do you think of the ears of the Bat in this picture ? What other animal has such ears in proportion to its body ? See how they expand themselves into great bags, ready to catch the slightest sound ! The Bat endowed with these ears is known as the Long-eared Bat. These enormous ears are certainly made to

perceive sounds that escape us owing to their excessive faintness. They enable the Bat to hear, at a distance, the fluttering of a tiny moth, the beating of a midge's wings as it dances in the air.

Other Bats, less richly endowed in respect of hearing, possess, in compensation, a sense of smell whose keenness is unequalled by that of any other creature in the world. The great perfection of this sense is due to the development of the nose, which covers a good part of the face and gives the animal the strangest appearance. For example, here is the head of the Horse-shoe Bat. This wide, curiously shaped, clammy distension which invades almost the whole of the space between the two eyes and the mouth, is the nose. It ends above in a broad triangular leaf; laterally it expands into folded leaves, the general mass of which, by its curved form, recalls a horse-shoe, whence the creature's name. What scent, however subtle, can escape such a nose! The Dog, so renowned for his sense of smell, chases the hare without seeing it, guided only by the emanations which the animal, heated by running, leaves along its track; but how greatly this Bat surpasses him, hunting, in like fashion, a tiny moth that has no scent whatever for any other nose! I am inclined to ask myself whether such a nose, expanded to the point of monstrosity, may not be capable of recognizing certain qualities of things which to us are and always will be unknown, since we lack the means of perceiving them. The grotesque

nose of the Horse-shoe Bat makes you boys laugh ; but it sets me thinking. I think of the thousands of secrets which Nature conceals from our senses and which to us would be so easy to acquire, as they would be valuable, had we the sense of smell of a miserable Bat. Who knows ? Perhaps the Horse-shoe Bat, with its monstrous nose, foresees the storm days before it comes ; scents the future tempest ; smells the rain-clouds coming from the ends of the earth ; knows by the scent what winds are going to blow ; distinguishes the flavour of the weather on the way ; and, guided by data of which we cannot even form an idea, it takes proper precautions in respect of its hunting, which is sometimes highly successful and sometimes the reverse, according to the state of the atmosphere.

JULES.—If the Bat's nose can do that it is certainly a wonderful nose.

PAUL.—I cannot say anything for certain ; I can only suspect. One thing only I think we cannot doubt ; that such an organ is the source of sensations unknown to man.

ÉMILE.—You have told us so much about it, uncle, that I shall end by thinking the nose of the Horse-shoe Bat much more curious than ugly. There is another thing I have just been examining. Why has the Horse-shoe Bat such fat cheeks ? See what a puffed-out face the Bat has in the picture !

PAUL.—For the Bat, the hours of the chase are

short ; one or two at most ; that is, the brief interval between sunset and the darkness of night. The rest of the twenty-four hours is spent in repose, in the silence of some cave or hollow. But does the Bat make only one meal in all this time ? And what of the evenings when hunting is impossible ? The sky is too dark, it is windy, or wet, and the insects hide themselves. The Bat would be subjected to long periods of fasting if it had no means of storing up provisions ; and it has to collect these provisions hastily, on the wing, without a moment's interruption of its brief chase. For this purpose it must have some sort of game-bags ; they must be capacious, so that the hunter can stuff his game into them as he seizes it. The cheeks serve this purpose exactly ; they can be distended at will, stuffed full of the insects killed with a snap of the teeth. These game-bags, in which the Bat stores its reserves of food, we call its *cheek-pouches*. The greedy Monkeys have such pouches. There the dainty Marmoset puts the lump of sugar we give him and allows it to melt deliciously, so that he can enjoy the taste at leisure. Well, the Bat, when it goes hunting, begins by satisfying its appetite ; then, above all when its nose, the famous nose you know of, tells it that the weather of the next few days will be unfavourable, it hunts with increased ardour, stuffing moth after moth into the depths of its elastic pockets. It returns to its lair with its cheek-pouches fully distended. Now, without fear of famine, it can,

if need be, wait for several days. Hanging motionless by one of its hind feet, it feeds upon its store of provender ; one by one, as its appetite demands, it nibbles the insects which, stuffed into its cheek-pouches, have become soft and toothsome.

But it is high time we said good-bye to the Bats ; their story would be too long if I were to tell you the whole. I will only ask Jules what he thinks now of these animals which at first he called hideous.

JULES.—Well, really, Uncle, I find them interesting rather than disgusting. Their singular wings, made out of hands ; their wonderful nose, and their huge ears, that make up for their weak sight, and their cheeks, stuffed out into provision-bags, are very curious and interesting.

ÉMILE.—I think the cheek-pouches in which the Bat preserves its game, and the nose that smells the storm are the queerest things about it.

LOUIS.—I shall never forget what a number of enemies the Bat saves us from.

PAUL.—You understand now, I hope. The Bats are useful to us, destroying a host of ravaging insects ; they are worth attention for their singular structure ; we ought not to feel an unreasonable disgust for them, still less a stupid anger, that would exterminate them. Let us leave the poor creatures in peace ; they gain their livelihood by valiantly defending our crops ; we will not do them harm under the stupid pretext that they are ugly, for their pretended ugliness is in

reality a wonderful adaptation of their structure to the animal's manner of life.

We have in France a good many species of Bat, which are divided into *Rhinolophi*,¹ *Vespertiliæ*,² and Long-eared Bats. The *Rhinolophi* have the nose provided with membranes, fringes, or crests of fantastic size and shape. Such is the Horse-shoe Bat, whose curious nose you have just been admiring; it inhabits deep caverns and old quarries. The Long-eared Bats are recognized by the exaggerated size of their ears; they frequent thickets and woods. The *Vespertiliæ* have a nose and ears of average dimensions. Most of the Bats are social creatures, hiding themselves by day in dark places; in hollow trees or ruined walls, barns, disused chimneys, crevices of the rocks and caves. The best known are the Serotine, with reddish fur, which spends the day in hollow trees and seeks places where there is water; the Noctule, an inmate of our houses, which leaves its retreat earlier than the Serotine and shows itself toward sunset; and the Pipistrelle, the smallest and commonest of the Bats, which frequents our barns and the warm shelter of our chimneys. It is this last, alone or in company with the Noctule, that you see flying round our houses.

¹ From the Greek *rhin*, nose; *lophos*, fringe.

² From the Latin *vesper*, evening.

VII

THE HEDGEHOG

UNCLE PAUL allowed a pair of Hedgehogs to wander about his walled garden. They had been brought in some years previously from the surrounding hills. One evening the children saw them trotting to and fro in a lettuce-bed. "Why," asked Émile, "has Uncle put these animals in the garden and told us to let them be if we came across them?"—"To make war on the mischievous insects, of course," replied Jules. "Look, there's one digging into the ground with its little black muzzle. Hush! Let's be quiet and see what he's after!"

Lest they should be seen, the children crouched down behind a row of peas. The Hedgehog, now scratching with his paws, and now digging with the tip of his muzzle, like the snout of a pig, finally unearthed a big white grub which had probably been fastened on to the root of a lettuce. The children hastened to examine the prey. The surprised Hedgehog quickly rolled himself into a prickly ball. Jules readily recognized the unearthed grub as a cockchafer grub, a devouring pest whose disastrous way of getting its

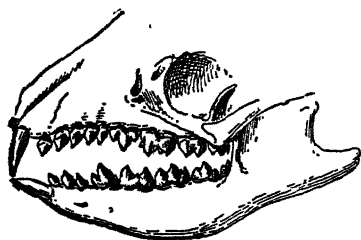
living Uncle Paul had already described. In the evening, when Louis had come, the Hedgehog naturally became the subject of conversation.

PAUL.—Some years ago, coming home at a fairly late hour, I came upon two Hedgehogs emerging from a heap of stones. I tied them up in my handkerchief in order to let them loose in the garden. Since then they have continually rendered me certain services, which you will be able to appreciate on examining the jaws here pictured.

JULES.—Teeth so pointed are not made to crop herbage. The Hedgehog must feed on living prey. It was in order to eat it that I saw it dig up a cockchafer grub just now.

PAUL.—Note that the teeth are sharply pointed in the upper jaw as well as the lower; these teeth fit into one another when the animal bites, and plunge into the flesh of the captured prey like so many keen daggers. With this complicated system of interworking teeth the Hedgehog would evidently be unable to grind up tough foodstuffs; it must have a soft, juicy diet, reduced to pulp by a few bites. The animal is, then, above all carnivorous. A few other species, in particular the Mole and the Shrew-mouse, have teeth like the Hedgehog's, armed with conical interworking points. Their diet is more or less similar to the Hedgehog's. All three, Hedgehog, Mole and Shrew-mouse, feed upon small game: insects, larvæ, snails caterpillars, grubs, worms; they are members of that

group of mammals which the naturalists call the order of *Insectivora*, that is, the order of insect-eaters; they devote themselves, on the surface of the soil and underground, to the same sort of hunting as that which the Bats prosecute in the air. In their way of living the Bats are certainly insectivores, for they feed upon insects, but their special organization causes them to be classified separately, in the order of



DENTITION OF HEDGEHOG.

the *Cheiroptera*. The mammals thus provide us with two orders of helpers: the *Cheiroptera*, which hunt on the ground and under the ground. To these latter belong

the Hedgehog, the Mole and the Shrew-mouse.

The Hedgehog, the largest of the three, requires larger and more abundant game. Small vermin is disdained; but a cockchafer grub, a plump mole-cricket, are good captures. When they are not too deeply buried, the Hedgehog digs with his paws and muzzle to unearth them. You have just seen my Hedgehogs at work in the lettuce-bed. All night long they will roam about the garden rummaging everywhere and crunching up quite a number of enemies without doing any appreciable damage. I have in them two vigilant guardians, who make their

rounds night after night, protecting my vegetables. However, despite all the interest I take in them, I owe it to the truth to admit their misdeeds.

The habitual diet of the Hedgehog is undoubtedly composed of insects ; but when a good opportunity presents itself the dainty beast is only too easily tempted by a larger and tastier prey. In the free state the Hedgehog does not scruple to drink the blood of young rabbits surprised in the nest when the dam is away ; the eggs of the quail and the partridge are his favourite delicacies, and he is at the height of bliss if he can twist the necks of a brood of chicks.

Last year, during the night, I heard a great disturbance in the fowl-house. The cocks were uttering cries of alarm, the hens desperately clucking and squawking ; I ran out. One of my Hedgehogs had squeezed under the door. I found the rascal sucking the blood of the chickens almost under the wings of their mothers, who could do nothing to defend them in the pitchy darkness. A kick sent the assassin rolling out of the fowl-house. On the following day I carefully repaired the fencing ; I stopped up the holes at the level of the ground, and after that I had no more complaints to make of my insect-hunters. So long as I take precautions against their bloodthirsty appetites I have in them two devourers of grubs of the greatest value for the garden.

LOUIS.—But are you not afraid of other damage ? I have heard people say the Hedgehog climbs trees

to shake the fruit down ; then he rolls on the fallen fruit, spits them on his prickles, and carries them off to his lair to eat them in comfort.

PAUL.—Let people talk, but don't you believe what they say. It is utterly impossible that a Hedgehog should climb a tree. Clumsy and thickset as he is, with such short legs, and nails that are certainly not robust enough for clambering, how could he manage a climb that calls for agility, curved claws and flexible limbs? No, my boy; the Hedgehog does not climb the trees; nor does he carry off their fruit impaled on his spines. There is just this much of truth in the story: the Hedgehog does not feed exclusively on living prey; if he finds fruit lying conveniently on the ground, a ripe, juicy pear or a peach, he will munch it with as much satisfaction as if it were a mole-cricket or a cockchafer larva.

LOUIS.—They say, too, that if you keep them in a house they will drive the rats away.

PAUL.—I am quite ready to believe that. In the daytime the Hedgehog rolls himself up and sleeps; but at night he is very active, incessantly seeking for slugs, big Scarabæi and other insects. It may very well be the case that the Hedgehog's turbulent hunting, as he inspects all the corners and crevices with his pointed muzzle, may alarm the mice and force them to decamp, especially as this nocturnal prowler gives off a disagreeable odour, very apt to reveal his presence. Having neither the nimble paw of the

cat nor her incomparable patience in ambush, the Hedgehog does not deliberately go hunting the rats and mice ; but if by chance he finds one within reach of his teeth he gladly makes it his prey, for his great delight is blood and fresh meat. When I want to give my Hedgehogs a treat I sometimes throw them a bit of beef-liver, all bleeding, or the raw giblets of fowls. All such food is devoured with the greatest avidity. Such frankly carnivorous tastes tell you plainly enough what would become of a mouse if they captured one. I attribute the disappearance from the garden of a few nests of rats that used to trouble me to their presence here.

To satisfy his gluttonous appetite the Hedgehog seems to attack any sort of prey indifferently ; it will even munch a Viper, heedless of its venom. Listen to this, which I will read from a book by a trained observer : " I had at that time, in a box, a female Hedgehog, who was suckling her young ; I placed in the box a vigorous Viper, which coiled itself up in the opposite corner. The Hedgehog slowly approached and sniffed at the reptile, which, immediately lifting its head, placed itself on guard, showing its poison-fangs. For a moment the aggressor recoiled, but soon returned, taking no precautions. The Viper bit her on the tip of the muzzle. The Hedgehog licked the bleeding wound, received a second bite on the tongue without permitting herself to be intimidated, and finally seized the snake by the middle of the body.

The two adversaries rolled furiously hither and thither, the Hedgehog grunting, the Viper hissing and biting again and again. Suddenly the Hedgehog snapped at its head, crushed it in her teeth, and with perfect placidity began immediately to devour the fore half of the reptile. This done, she regained the opposite corner of the box, and, lying on her side, began quickly to suckle her young. On the following day she ate the remainder of the snake."

JULES.—And the Hedgehog did not die of all those poisoned wounds ?

PAUL.—Not a bit of it ; she did not even seem to be inconvenienced. " After an interval of a few days the same experiment was several times repeated with other Vipers ; the result was the same. Despite the bites, which covered her muzzle with blood, the Hedgehog always ended by devouring the reptile, and neither the mother nor her offspring suffered any ill consequences." I will not venture to say whether the Hedgehog is absolutely insensible to the Viper's venom ; at all events, in the various experiments which were made she endured the reptile's venomous bites with astonishing indifference when she attacked the latter to obtain a tasty meal. At the most she may have felt a passing discomfort as the result of wounds which would certainly have endangered a man's life.

The Hedgehog enjoys other immunities, no less curious. You will remember the Cantharides, that



(a) HEDGEHOG AND VIPER ($\frac{1}{3}$). (b) MOLE ($\frac{1}{3}$). (c) SHREW-MOUSE ($\frac{1}{3}$).

To face p. 66.

magnificent insect with a pungent odour, which lives on the ash-trees, and whose wing-covers are resplendent with green and gold. I spoke of it when telling you the history of the Destroyers.

JULES.—I remember. Dried and powdered, the insect is used to make blisters which, if applied to the skin, will quickly make a raw wound.

PAUL.—If the dust of the Cantharides attacks the skin so readily, what must it not do if introduced into the stomach? What animal could swallow it without corrosion of its entrails, without atrocious pain followed by a speedy death? Well, by an exception which I cannot explain, the Hedgehog is able to eat this horrible poison. A celebrated Russian naturalist, Pallas, has seen it make a meal of handfuls of these beetles without suffering any harm. To consume a dish of this sort it must certainly have a specially constructed stomach!

There was once a king, greatly renowned in history, Mithridates, who, knowing himself to be surrounded by enemies capable of poisoning him sooner or later, gradually accustomed himself to the most poisonous drugs in order to conjure the peril. By increasing the dose day by day, he finally, they say, became insensible to poison. The Hedgehog is the Mithridates of the beasts; but how far it surpasses the suspicious king! Without any apprenticeship it braves with impunity the corrosive poison of the Cantharides and the dreadful venom of the Viper.

I like to think that the Hedgehog has not been endowed with these exceptional gifts in order to leave them unemployed. It must have a liking for the spots haunted by the Viper ; on its nocturnal rounds through the thickets it must surprise the reptile in its lair and crush its head with its pointed teeth. What services must it not perform in places infested by this dangerous pest ! Yet man persecutes the Hedgehog, execrates it, treats it as unclean vermin, good for nothing but to arouse the fury of his dogs, which cannot bite at its spiny back ; he invents expressly for it the torture of immersion in cold water, to force it to unroll itself ; and if the beast persists in its attitude of passive defence, remaining rolled up into a ball, he prods it with a pointed stick, impales it, disembowels it.

JULES.—We will never ill-use the Hedgehogs, Uncle Paul. We are too much afraid of vipers to deprive ourselves of this valiant defender !

ÉMILE.—What are the prickles of the Hedgehog ?

PAUL.—Hairs, nothing else, but very thick, stiff, and pointed like needles. Mingled with other finer hairs, supple and silky, which answer the purpose of fur, they cover the whole of the upper part of the body. As for the lower part, it has only silky hairs ; otherwise the animal would wound itself when it rolls itself up. When the Hedgehog, a very circumspect animal, is conscious of danger it tucks its head into its belly, brings its feet together, and rolls itself into a ball which in every part presents an armoured coat of

spines to the enemy. The Fox, according to the ancients, knows all sorts of cunning tricks; the Hedgehog knows only one, but it is always effectual. What rash creature would dare to snap at the Hedgehog in its posture of defence? The dog refuses to do so; after a few unfortunate attempts, which make his mouth bleed, he obstinately refuses and contents himself with barking.¹ Protected by its prickly covering, the Hedgehog turns a deaf ear to these idle menaces and remains coy. If the dog, further excited by his master, returns to the charge, the Hedgehog has recourse to a last warlike expedient which rarely fails of its effect; it voids its malodorous urine, which oozes from the interior of the ball and moistens the exterior. Repulsed by the odour of the stinking beast, pricked on the nose by its spines, the most eager of dogs renounces the attack. The enemy having departed, the Hedgehog unrolls itself with prudence and makes haste to trot off to some secure retreat.

¹ I have known a dog, yelping with fury, strike repeatedly at a hedgehog with his two fore-paws, leaping up on his hind legs to put the full weight of his body behind the blows. As I intervened, out of respect for the hedgehog and the dog's paws, I can say nothing as to the result, except that the hedgehog was apparently unhurt, since when left to itself it unrolled and disappeared.—Tr.

VIII

HIBERNATION

PAUL.—Our Bats feed exclusively on insects, and the Hedgehog makes of them its principal diet, although it may from time to time hunt larger game, or even eat fruit. Now, in winter there is a lack of insects in the perfect state; most of them have died, after laying their eggs; and the rare survivors are invisible, sheltering from the cold in hiding-places which would be very difficult to find. On the other hand, the larvæ, the hope of future generations, are slumbering far out of sight: underground, in the trunks of ancient trees, in the depths of inaccessible crevices; the cockchafer grub, to escape the frosts, has descended to a depth of several feet from the surface of the soil; no more mature cockchafers for the Long-eared Bat, no more twilight moths for the Noctule and the Pipistrelle, no more Scarabæi for the Hedgehog. What will become of these insect-eaters?

JULES.—They will die of hunger.

PAUL.—They would die but for the disposition of Providence which I shall try to explain to you.

You know the proverb : “ *Who sleeps, dines* ” ; a proverb which contains, though expressed in a rough and simple fashion, a great deal of truth. Well, the Hedgehog, the Bats, and others put it into practice as though they knew all about our human wisdom. When no longer able to dine for want of insects, they proceed to sleep, but with a sleep so heavy, so profound, that a special word is employed to denote this sort of sleep ; it is called *lethargy*.

Another proverb says : “ *As you make your bed you must lie on it.* ” The animals never lack sense in arranging their own affairs ; they are careful to remember this, and take wise precautions before abandoning themselves to their winter sleep. The Hedgehog chooses a cavity amidst the stout roots of a tree-stump. On the decline of autumn it carries thither grass and dead leaves, which it arranges in a hollow ball, in the centre of which it rolls itself up and goes to sleep. The Bats gather in innumerable bands in the warm recesses of some cavern, where nothing can come to trouble them. Head downwards, huddled together, they cling to the walls, which they cover with a sort of furry tapestry ; or clinging to one another, they hang in clusters from the roof. Now the winter may do its worst ; the winds may rage ; the Hedgehog in its thick shell of leaves, and the Bats in their sheltered lair, slumber profoundly until the warm weather returns and with it the insects, food, movement and life.

ÉMILE.—And all the winter long they eat nothing at all ?¹

PAUL.—Nothing.

ÉMILE.—The Bats and the Hedgehog must have some secret of their own. For my part, I have a much better appetite in winter, and sleeping would not satisfy my hunger !

PAUL.—Yes, the Hedgehog and the Bat have a secret of their own. I will tell you what it is, but I warn you it is not very easy.

There is one need before which hunger and thirst must be silent, however violent they may be ; a need always recurring and never assuaged, which makes itself felt continually, waking or sleeping, night and day, at all hours, at every moment ; that is, the need of air. Air is so necessary to the maintenance of life that we cannot regulate its consumption, as we can that of food or drink ; in order to avoid the fatal consequences that the least forgetfulness would entail it is, so to speak, without our consciousness, independently of our will, that the air penetrates our bodies to fulfil its miraculous task. Before all else we live on air ; our ordinary food takes only a second

¹ There are exceptions to this general habit ; the Bat awakes when conditions are favourable. In the West of England I have seen them all through a warm winter, coming forth on mild evenings to their usual haunts along the streams, round inhabited premises, or on the seashore, under the cliffs whose caves and crevices give them shelter ; in short, wherever clouds of midges may be seen in the winter twilight. This refers to at least two of our English species.—Tr.

place. Our need of food is felt only at fairly long intervals ; our need of air is felt continually ; it is always imperious, always inexorable. Try only for a moment to prevent its access to the body, by closing its gates, the mouth and the nostrils : almost immediately you begin to suffocate, and you feel that you would inevitably perish if this state were to last a little longer.

Air is of the most pressing necessity, not only to man but to all the animals, from the tiniest mite, barely visible to the eye, to the giants of creation. The physicist proves this by a striking experiment. A living animal, a bird, for example, is placed under a container glass, from which the air is gradually withdrawn by means of a special contrivance known as a vacuum-pump. As the air disappears, drawn away by the pump, the bird staggers, struggles, with an anxiety horrible to see, and falls, dying. Unless the air is allowed to return to the pump at once the poor little thing is dead, quite dead ; nothing can recall it to life. But if the air is admitted in time its action reanimates the bird. Again, a lighted candle placed under the container will be extinguished directly the air is withdrawn. The animal must have air in order to live ; the candle must have air in order to burn.

What I am going to tell you now will explain the cause of this absolute necessity of air for the maintenance of life. Man and the higher animals, the mammi-

fers and the birds, have a temperature of their own, a heat which results not from external conditions, but from the mere process of life. Under a burning sun, just as amidst the frosts of winter, in the torrid climate of the Equator as in the glacial cold of the Poles, the human body has a temperature of $37^{\circ}6'$ Centigrade, or $98^{\circ}4'$ Fahrenheit ; and this temperature cannot fall without deadly danger to life. The natural heat of birds runs as high as 42° Centigrade, or $107^{\circ}6'$ Fahrenheit, at all seasons and in all climates.

How is it that this temperature always remains the same ? And whence does it come if not from a sort of combustion ?—There is, as a matter of fact, a sort of combustion that is always taking place in our bodies ; respiration supplies the air for it, and our food supplies the fuel. To live is to be consumed, in the strictest acceptation of the word ; to breathe is to burn. In all ages men have spoken, in figurative languages, of the *torch of life*. Now this figurative expression is the exact expression of the reality. The air consumes the torch ; it consumes the animal ; it causes the torch to give off light and heat ; in the animal it produces heat and movement ; without air the flame of the torch goes out ; without air the animal dies. The animal, from this point of view, may be compared with a machine of the greatest perfection set in motion by a central furnace. It feeds itself and respire in order to produce heat and movement ; it absorbs its combustible fuel in the

form of food and burns it in the depths of its body with the air taken in during respiration. This is why the need of food is greater in winter. The body cools more rapidly in contact with the cold outside air ; so it has to burn more fuel, that the natural temperature may not diminish. A low temperature increases the need of food ; a high temperature means a more languid appetite. The famishing stomachs of the Siberian peoples call for a robust diet of fat, bacon and alcohol ; the tribes of the Sahara need no more than a few dates and a pinch of flour kneaded in the palm of the hand. All that diminishes the loss of heat diminishes also the need for nourishment. Sleep, repose, warm clothing, all are adjuncts to food and in some degree make up for deficiencies. Common sense says as much when it says, " Who sleeps, dines."

JULES.—That may be so, but I do not yet see how the Hedgehog and the Bat are able to go four or five months without food. I might go to sleep in vain ; I could never bear such a long fast !

PAUL.—Wait until I have told you everything. For the moment, remember this : in every animal the maintenance of life results in a true and continual combustion. The air, which is as necessary to this vital combustion as to the burning of wood and coal in our grates, is introduced into the body by respiration. This is the explanation of the urgent and continual need to breathe. As for the materials burned, they are provided by the actual substance of the animal,

by the blood into which the foodstuffs are transformed when digested.

JULES.—They say of a man who works very hard and does not rest after his work that he is “burning himself out.”

PAUL.—And you have heard of people who “burn the candle at both ends.” Well, once more the popular saying is in close agreement with what the scientists tell us of the processes of life. Not a movement is made, not a fibre quivers without a proportionate expenditure of fuel, furnished by the blood, which itself is maintained by the digestion of food. To walk, to run, to feel emotion, to work, to concentrate the mind—this is literally to burn up one’s blood, just as a locomotive burns its coal in order to pull after it the enormous load of its train. This is why activity and difficult labour excite our desire to eat, while rest and idleness tend to diminish it.

I will now ask you a question. There are, I will suppose, in the fireplace, a few logs burning; and you want to keep the fire alight and burning as long as possible. Will you allow these logs to burn freely, or take the bellows to blow a draught over the embers and make them burn more brightly?

JULES.—That would be just the way to finish them up quickly. On the contrary, we should have to cover them with ashes. Then only a little air would reach the embers, and that not easily, so that combustion would be slower, and on the following

day we should find that the charred logs were still burning.

PAUL.—That is very well explained, my boy. To keep the fire on the hearth burning for a long time without adding fuel we must slacken the draught, diminish the air-supply, but without altogether preventing it, for then the fire would go out. For this purpose we bury the logs under the ashes, and in the case of a stove we close the door and shut the dampers. More air means more active combustion but of brief duration ; less air means feeble combustion but of long duration.

Since the maintenance of life is the result of a true combustion, the animal made to endure a long fast, which will not permit it to renew the fuel consumed, that is, the blood, must diminish the access of air to its body ; must, in a sense, diminish the draught of the vital furnace. Now, this draught is the respiration. In order to live for months without food and eke out the little fuel that the veins hold in reserve, the animal has but one resource : to breathe as little as possible, without absolutely depriving itself of air, for this would mean the sudden extinction of life, just as the extinction of a lamp is the necessary consequence of a total lack of air. You have here the whole secret of the Hedgehog and the Bat, by which they endure without perishing the long abstinence of winter.

First of all, the most carefully devised precautions are taken to avoid any loss, any superfluous expenditure

of heat, and to economize as far as possible the reserves of fuel in their poor little veins. The Hedgehog encloses itself in a thick shell of leaves in the middle of a heap of stones, or a hollow beneath a tree-stump ; the Bats huddle together in clusters in the warm recesses of some cavern. But this is not enough. There must be no movement, since movement is obtained only by an expenditure of heat. This condition is scrupulously fulfilled ; their immobility is such that you would think them dead.—Even this is not enough. The respiration must be reduced to the utmost possible limits. And indeed, their breathing is so feeble that it can only just be detected by attentive observation. As you will realize, this extreme of vital economy can no longer be compared with the burning of a fire on the hearth, or a torch, which, burning in the free air, gives off waves of light and heat ; it is rather like the faint glimmer of a nightlight which burns its drop of oil as though with regret ; it is like the smouldering of the charcoal slowly consumed under the ashes. The stupor is so profound, the swoon so complete, that if it were not followed by an awakening this condition would hardly differ from death.

This temporary suspension of life, or rather this retardation of life, to which certain animals are subject during the winter, is known as *hibernation*. Among the number of the *hibernating* animals, that is, those subject to hibernation, there are, as well as the Hedge-

hog and the Bat, the Marmot, the Dormouse, the Lizards, the Vipers, the Frogs, and other reptiles. I need hardly tell you that in order to lapse into this state of coma, which renders food unnecessary for months together, an animal must be specially organized. It is not every animal that can suspend its respiration in order to avoid the necessity of eating. The dog and the cat, for example, might slumber never so profoundly ; since their respiration is almost as active during sleep as in the waking state, hunger would soon awaken them.

ÉMILE.—As it would awaken me.

PAUL.—No species whose food-supply is assured during the winter is subject to hibernation. Those whom the cold would inevitably deprive of food are safeguarded from destruction by the providential torpor which overcomes them at the approach of winter. Finding nothing more to eat, they sleep. The Marmot sleeps when the snow covers the turf of its lofty mountains ; the Dormouse sleeps when no fruits or seeds are obtainable ; the Frogs, the Toads, the Snakes, the Lizards, the Bats and the Hedgehogs sleep when there are no longer insects to be found.

IX

THE MOLE

UNCLE PAUL had just taken in a trap a Mole which, for several days, had been upheaving the soil in a corner of the garden, to the detriment of the plants and seeds. He called the boys' attention to the creature's black fur, softer than the finest velvet; he showed them its muzzle, adapted to the work of excavation; and its fore paws, great spades which remove the soil with astonishing rapidity; its eyes, reduced to mere specks, and almost useless; and above all its mouth, armed with terrible-looking teeth.

PAUL.—It is a great pity that the Mole does damage by its tunnelling, for there is no more ardent destroyer of vermin in the world.

LOUIS.—I have always heard it said, and I believed until now, that the Mole fed on grass and vegetables, chiefly on the roots, and that it burrowed underground in order to get them.

PAUL.—In order that you may avoid the general errors as to the diet of certain animals, I have given you a few details in respect of the conformation of their

teeth, which are always adapted to the kind of food consumed. I have shown you that it is enough to examine its jaws to determine whether the animal is herbivorous or carnivorous. Remember the phrase that sums up the first few of our talks : *Show me your teeth and I will tell you what you eat.*

The Mole shows you its teeth. There are forty-four, all ferociously pointed or jagged, except the incisors. What do you see here—mills for quietly grinding roots or sharp-edged implements for cutting up mangled flesh ?

LOUIS.—These are certainly the teeth of an animal that feeds on living prey ; the Hedgehog's and the Bat's teeth are no sharper.

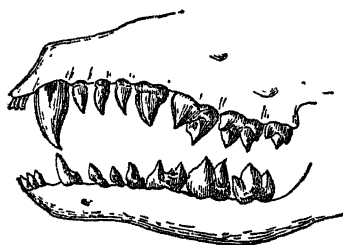
PAUL.—To dispel any uncertainty, if such teeth can leave you in any doubt as to their sanguinary purpose, I will describe some experiments made in respect of the diet of Moles. We owe them to a learned French naturalist, Flourens. If, when you are older, you ever happen to read his remarkable works, you will be able to appreciate the high value of the authority I am invoking.

Flourens placed in an empty barrel two live Moles, and thinking them herbivorous, gave them for food some roots, carrots and turnips. As you see, the eminent naturalist shared the common prejudice, the erroneous idea of which Louis just now reminded us. He was soon undeceived. On the following day the roots were untouched, but one of the Moles

had devoured his companion ; only the skin was left, turned inside out !

ÉMILE.—One of the Moles had eaten the other ? Oh, the ferocious beast !

PAUL.—It had made a meal of its fellow-creature, a thing that perhaps no other species of animal would do. In devouring its companion it had eaten, during the night, its own weight of food ; yet in the morning it seemed restless and extremely hungry. Flourens



DENTITION OF MOLE.

threw it a live sparrow, whose wings he had clipped. The Mole sniffed it, walked round it, received several hard pecks, and then, falling upon the bird, tore open its body, enlarging the wound with its claws in

order to plunge its head into the smoking entrails. With its pointed muzzle the horrible beast rooted among them with every sign of frantic delight. In no time it had devoured half the contents of the bird's skin, which, with the feathers, it left intact. Flourens then placed at the bottom of the barrel a glass of water, full to the brim ; he saw the Mole stand up against the glass, cling to the brim with its fore claws, and drink thirstily. Its thirst appeased, the animal returned to the sparrow, ate yet a little more of it, and at last replete, it fell asleep in a corner.

The glass and the remains of the sparrow were removed.

Hardly six hours later the Mole, famishing again, was exploring, by scent, the bottom of the barrel, in search of something to eat. A second live sparrow was thrown to it. As before, it instantly snapped at the bird's breast to get directly at the entrails. When it had eaten the greater part of the bird and had drunk abundantly it seemed to be sated and rested quietly. This was its last meal of the day. You will realize that it needs a sanguinary feast indeed to appease the hunger of a Mole. During the night, its companion in captivity; during the day, two sparrows. In twenty-four hours the weight of the food consumed was equivalent to nearly twice the weight of the animal itself.

Was the fury of its appetite at all appeased? Not in the least! On the following morning the Mole was wandering restlessly about the bottom of the barrel; it seemed as though exasperated by a too-prolonged fast; its famished stomach protested. Quick, quick, something to eat, or it will die of starvation!—the rest of the sparrow of the day before and a frog, attacked as always in the belly, enabled it to contain itself awhile. Finally it was given a toad. As soon as the Mole approached it, to disembowel it, the toad puffed itself out, hoping perhaps to frighten the enemy by the repulsive aspect of its swollen body. It succeeded in doing so. Having smelt at

it, the Mole turned away, repulsed by an invincible disgust.—What, dainty creature, do you refuse the toad? Then you shall have turnips, cabbages, carrots. But away with such roots! Death rather than a meal of turnips! The following day the Mole was dead of starvation amidst all this vegetable profusion. It had disdained even to bite the roots.

Had the animal experimented on an exceptional appetite or abnormal tastes, that it preferred to die of hunger rather than touch vegetable food? Not at all; its diet was that of its whole race. A number of further experiments were made, both by Flourens and by other observers. All the Moles that were given only vegetable foods—bread, greenstuffs, cabbages, roots, grass and herbage of whatever kind—invariably died of hunger without touching their provisions. On the other hand, those survived that were fed on raw meat, worms, larvæ and insects of all sorts.

Another very simple method of determining beyond a doubt the nature of their food consists in examining the contents of the stomachs of Moles living at liberty and captured in the fields. Whatever they eat must be found in their stomachs. Let us open the stomach of a Mole and see. It contains sometimes the red segments of the common earthworm or lobworm, sometimes a mass of beetles, recognizable by the leathery remains which are unaffected by digestion, fragments of the legs and wing-covers; sometimes, and more often, a mixture of larvæ, especi-

ally the white worm or cockchafer larva, of which such distinctive signs may be found as the mandibles and the hard envelope of the head. One finds therein a little of all the small game that haunt the soil : woodlice and millipedes, insects and worms, grubs and chrysalids of moths, subterranean nymphs and larvæ ; but the most careful examination fails to discover a single scrap of vegetable matter.

All methods of observation, therefore, lead us to the same result. Despite the common belief, it is certain that the food of the Mole consists exclusively of animal substances. And I ask you, could it be otherwise ? How should the contents of the stomach fail to conform with the ferocious set of teeth which you have seen ? By this characteristic alone may we not recognize the insatiable carnivore ?

The Mole is exclusively carnivorous : this everything affirms. On the other hand, let us bear in mind the monstrous appetite with which the creature is endowed, if we may apply the term " appetite " to the famishing fury of a stomach that in twelve hours demands a quantity of food equivalent to the weight of the beast itself. The life of the Mole is a gluttonous frenzy, ever recurring, never assuaged ; these fits of raging hunger attack it three or four times a day ; and it dies of starvation after only a few hours of abstinence. What can the Mole count upon to appease the anguish of a stomach in which the food seems to melt and disappear almost as soon as it is swallowed ?

Evidently the live sparrows which it devoured with such delight in Flourens' experiments are not meat for a hunter that works underground ; at the most some wretched frog, straying through the field, may from time to time fall a victim to its jaws. What then remains ? Why, the larvæ that live in the soil, and in the first place the larvæ of the cockchafer, tender and fat as bacon. They are small, I admit, to still such hunger, but their numbers make up for their size. What an extermination of white worms must take place, then, when the soil abounds with this small game ! Hardly is one meal over when the next begins, and at each meal, without a doubt, the grubs perish by the dozen. No helper is so valuable as the Mole when it comes to cleansing a field of these formidable ravagers.

A frantic destroyer of vermin is the Mole : that is what induces me to speak in its defence and to accord it, not without a certain regret, the noble title of auxiliary. This title, indeed, it deserves only with serious restrictions. To get at the mole-crickets, white worms and larvæ of all sorts on which it feeds, the Mole is obliged to burrow among the roots which the larvæ inhabit. Numbers of roots which obstruct its work are cut through ; the plants are dislodged and uprooted, and the soil from the tunnels excavated is piled up on the surface in the form of little heaps or *mole-hills*. By such upheavals of the soil a row of annual vegetables is quickly ruined, or a seed-plot

thrown into confusion. In a single night a Mole can turn a considerable area topsy-turvy, for the famishing beast tunnels the soil in which it hopes to find something to eat with remarkable celerity.

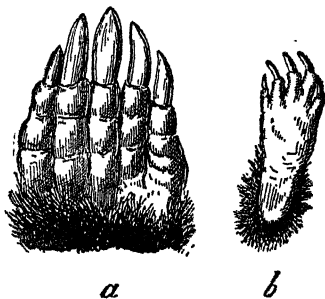
In every detail of its structure the Mole is adapted for the rapid excavation of its hunting galleries, which it prolongs for hundreds of yards. Its body is thickset, round, almost cylindrical from end to end, in order to glide without resistance through its narrow corridors. The fur is short, dense and carefully burnished, so that it does not collect dust or dirt, but remains perfectly clean, even in the moistest and most adhesive soil. The tail is very short; there are no external ears, although the hearing is very keen. The various appendages which are often so highly developed in the animals that live in the open air would be a hindrance underground; so the Mole suppresses them as too encumbering. No luxury, but all that is strictly necessary for its strenuous work as a tunneller. Eyes widely opened, accessible to particles of the earth which the Mole is constantly shifting, would be for it a source of continual torment; moreover, what need has it of such in the absolute darkness in which it dwells? The Mole is not precisely blind, as is commonly believed; it has eyes, but they are quite small, and buried, almost out of sight, in the depth of its fur. The sense of smell guides the Mole; a sense of smell as subtle as that of the pig, and it has the pig's snout, apt to unearth the dainty morsel

revealed by its scent. With its snout the pig divines and discovers the fragrant truffle beneath the soil ; and so the Mole divines and discovers the plump white worm. To reach it through the network of the roots and the thickness of the soil it has fore paws that are enlarged into enormous hands, armed with claws of exceptional strength. These hands, powerful spades capable of opening up a way through tufa if need be, are the special and characteristic tool of the Mole. As it advances, poking with its snout, cutting away the earth with its hands, the soil is thrust backwards into the tunnel by its hind feet, which are much weaker than the hands, but sufficient for their less strenuous task. If the Mole proposes to return by the same road the path he follows must be kept clear ; so the excavated earth is pushed out into the open air, forming mole-hills at intervals.

For the moment these details will suffice. Let us proceed to the much-vexed question of the Mole's utility. Should we, in consideration of the incontestable services which it renders, tolerate it in our fields ? Should we, because of its detrimental excavations, regard it as a pest and wage upon it a war to the death ? This last opinion seems generally to prevail ; war to the death is declared to such an extent that there are men who make a calling of destroying Moles, and in the country a Mole unearthed by the spade is rarely given quarter. I will permit myself to observe, to the merciless enemies of the

Mole, that the white worm does far more damage, and that in order to rid a field of this pest nothing can equal the famishing hunter. Despite the contrary opinion, I believe the presence of Moles, in moderate numbers, is necessary in a field; I believe it would be a mistake to destroy them entirely. The experiment has already been tried. I know countrysides where the Moles, pursued to the death, have finally disappeared. Now, do you know what happened? The white worms multiplied to the point of devastating the pastures. To rid themselves of this formidable enemy the farmers had to allow the Moles to return, and to put up with them so long as they did not become

too numerous. There are other reasons, of secondary importance, it is true, why we should regard the Mole with favour. Mole-hills consist of loose, finely divided soil, which, if spread over the fields by means of the rake, is highly beneficial to the young grass-shoots; while the subterranean galleries are so many drains which improve the soil by providing an issue for the surplus water, just as so many drainage-canals would do. After justly weighing the arguments for and against, I am of the opinion that the Mole should



FEET OF MOLE.

a, fore foot; *b*, hind foot.

not be proscribed on agricultural land ; at all events, unless it multiplies to excess.

LOUIS.—And in a garden ?

PAUL.—That is another question. In a few hours a Mole may turn a whole bed of vegetables, a whole seed-plot topsy-turvy, leaving it in a pitiable state. Who would have such a burrower in his kitchen garden ? You carefully sow your seeds in the ground, you plant out your rows of young plants, you level the ground, you make irrigation-trenches ; and on the following day—a plague on the beast !—the Mole has turned everything upside down. Hey for a spade, a trap ! Let us get rid of the troublesome creature as quickly as may be ! But what if the white worm and the grey worm abound. Shall we be any better off if we kill the Mole ? No, for the vermin will soon do more harm than the Mole has done to-day ; the damage will be worse, that is all. If I had a garden infested with cockchafer grubs this is what I should do :—In the spring I should release half a dozen Moles, caught in the fields, and I should leave them at peace to devote themselves to their hunting. When the grubs were exterminated and the soil cleansed I should recapture my Moles.

LOUIS.—Then you can catch them when you like ?

PAUL.—Nothing is easier : you will see.

X

THE MOLE'S NEST—THE SHREW-MOUSE

PAUL.—Of the Mole's labours only the little mounds of earth or mole-hills, and the tunnels, longer or shorter, just under the surface, are familiar to you. These tunnels are hunting-paths ; the animal makes them in order to search amidst the roots for the larvæ on which it feeds. If the spot is rich in game the Mole lingers there, probing to the right and left of the points at which it scents a prey ; if one district is poor it prolongs its tunnel, or else bores others, running hither, thither, in all directions, until it has found a place to its liking. But however rich in larvæ the spot may be, a single lode is soon exhausted ; so the old tunnels are therefore abandoned, and others are driven, from day to day.

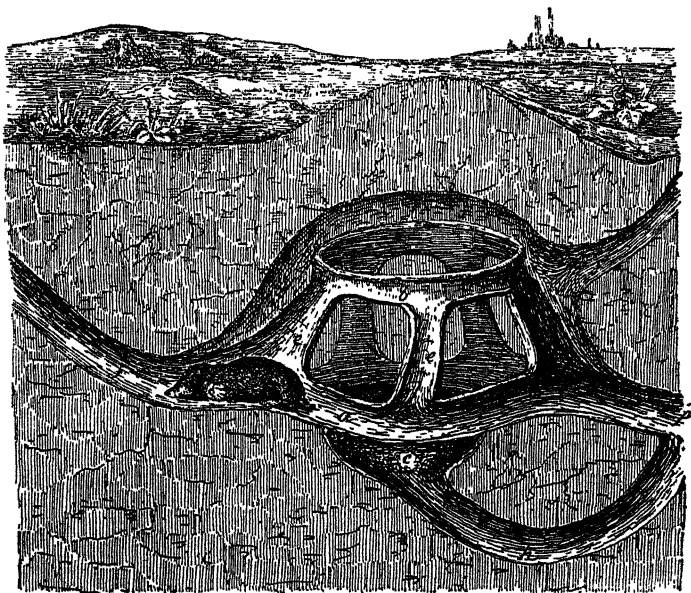
Close to its hunting-ground, which is penetrated by fresh corridors as the need for them arises, the Mole possesses a nest or burrow, a permanent domicile, to which it retires in order to rest, sleep, and rear its family. This refuge is a work of art, a stronghold in whose construction the wary animal displays, in the prudential measures taken for its own security, a

consummate architectural talent. We must not confound it with the mole-hills, mere heaps of earth carelessly thrust into the air ; the Mole never dwells beneath these loose accumulations.

Its dwelling is quite another sort of structure. It is underground, at a depth of two or three feet, commonly under a hedge, at the foot of a wall, or amidst the thicker roots of a tree. This natural shelter gives the structure greater security and protects it from subsidence of the soil. Its principal chamber, as shown at *c* in the figure, is made in the shape of a flask, head downwards, the walls being carefully plastered with clay and smoothed. A warm bed of moss and bits of herbage is all the furniture. This is the Mole's place of repose, its bedroom, and the family nest. Two circular tracks surround it at a certain distance ; the lower, *a*, being the larger in diameter and the upper, *b*, the smaller ; these two circular galleries are to safeguard the central apartment. From the upper gallery, which is reached by one of the three passages communicating with the chamber, the Mole can hear what is happening outside. If any danger threatens, half a dozen passages, *e*, enable it promptly to descend to the lower gallery and thence to gain its escape by one of the many emergency corridors, *f*. These radiate in all directions ; after running straight for a short distance they turn aside and open into the large tunnel of exit, *p*. If danger surprises the Mole in the chamber

itself, it disappears by the passage *h*, which starts from the basement of the structure, turns round upon itself, and again opens into the principal track, *p*.

ÉMILE.—One loses one's way among all these



NEST OF MOLE (SECTION).

passages and circles and separate floors. The Mole's house is very complicated.

PAUL.—For us, perhaps ; not for the Mole. With its labyrinth, whose twists and turns and exits are so familiar to it, the Mole can quickly escape from danger. You may think to seize it in its lair, but hey presto !—it has fled, and you do not know whither.

The corridors of escape—those which radiate from

the lower circular gallery as well as that which starts directly from the chamber—all end in *p*, the path of entry to the nest. From this starts the main tunnel communicating with the hunting-ground, the permanent way along which the Mole passes some three or four times daily, whenever it sets out on a hunting expedition or returns to its lair. This tunnel, always the same as long as the nest survives, is far more carefully made than the mere saps driven hither and thither in obedience to the requirements of the chase ; it lies deeper, is wider and smoother, and the earth of the walls is well packed ; no mole-hill stands above it ; the ground along its course is not sunken, yet something betrays it to the observer. On account of the Mole's incessant journeys to and fro, the roots are more extensively damaged than along the course of the ordinary tunnels ; consequently the turf covering this tunnel has a sickly appearance, a yellowish tinge. Once we are aware of this passage, and the yellowish streak of turf betrays it, we may capture the Mole when we please. We have only to set a trap in the tunnel. Compelled to follow this path on leaving or returning to the nest, the Mole cannot fail to be caught in the course of the day.

LOUIS.—That is quite clear. I see now that it would be easy to recapture the Moles when you pleased, if it seemed advisable to release them in a garden in order to destroy the cockchafer grubs.

PAUL.—To bring the story of the Insect-eaters to

a close, I must tell you something about the smallest of the mammals, the *Shrew* or *Shrew-mouse*, whose length is barely two inches. This tiny creature bears some resemblance to the Mouse, but is much smaller. Its tail is shorter, its head finer and its nose more pointed. Its ears are short and rounded. Its face is much like that of the Mouse.

The Shrew-mouse has the same tastes as the Mole. It is an eager hunter of small game ; a devourer of larvæ and insects, as its fine jagged teeth testify. Its slender body, capable of slipping into the smallest hole, its long pointed muzzle, able to explore the narrowest crevice, enable it to forage wherever vermin finds a refuge. The woodlouse rolled into a ball in some crack of the wall, the slug sheltering under a stone, must beware, for the Shrew-mouse will find them, this tiny creature that could curl up inside a walnut-shell. In vain will they hide themselves ; the Shrew-mouse does not need to see them in order to discover them. With her subtle sense of smell she divines them ; the slightest movement, and she hears them. The burrows of the Dung-Beetles, the warrens of the larvæ, the retreat of the tiniest worm, have no secrets from her. She might be called the insect's ferret.

The Shrew-mice frequent the meadows, fields and gardens ; in winter they approach the houses and take refuge under the stacks of hay or straw, or in manure-heaps. When the frosts are severe they will even enter the barns, where they live on cockroaches

and woodlice ; but in the warm weather the open air calls them, and we find them now in the fields, where these tiny vermin-hunters aid in the Mole's task of extermination, now in the garden, whose espaliers and vegetable-beds they protect from the tribes of the devourers, without ever touching the fruit, roots or seeds. Their teeth enforce the completest abstinence



DENTITION OF SHREW-MOUSE.

from all vegetable food ; the Mole is not more frankly addicted to its carnivorous appetites. On the other hand, in their hunting, so beneficial to ourselves, the Shrew-mice do us no manner of harm, since

they drive no tunnels, but merely profit by the natural fissures of the soil. They cannot be reproached with cutting roots or with turning up the soil as do the Moles ; yet, even more perhaps than the latter, they are in our countryside the object of universal execration. Folk destroy them whenever they get the opportunity, and believe they are performing a useful action.

How is it that a beast so tiny, so graceful and so useful has become such an object of human hatred ? Here again, my dear boys, we have an example of the stupidity which results from the habit of accepting the first idea that comes without seeking to confirm it in the light of observation or reason. It is pretended

THE MOLE'S NEST—THE SHREW-MOUSE 97

that the Shrew-mouse bites the feet of horses and causes them incurable wounds. But, good people, how could a Shrew-mouse, whose head is no larger than a pea, bite a horse and penetrate its hide, which is nearly as thick as one's finger ?—The Shrew-mouse, they say, is venomous, even to man. I told you some time ago the story of the Viper ; you know what its weapons are : two long hollow teeth which introduce a drop of venom into the wound they make. Well, I assure you, in all certainty, the Shrew-mouse has no such weapon as the Viper ; it has not the Viper's fangs, nor its reservoir of virus ; it is utterly inoffensive to man and horse. Only the insects need fear its sharp teeth ; not because they are poisoned in any way, but because they bite extremely well.

I think I can see what has earned the Shrew-mouse the reputation of being venomous. The graceful creature perfumes itself and smells rather strongly of musk. The cat, taking it for a mouse, sometimes hunts it ; but, repulsed by its odour, she never eats it. Those who were first to remark this fact told themselves, without further inquiry : " Since the cat does not eat it the Shrew-mouse is venomous." Since then this false idea has spread through the country, and no one has dreamed of examining the question more closely ; so the poor Shrew-mouse, one of the most irreproachable of our auxiliaries, perishes a victim to the stupidity of the man whose garden it protects.

XI

A STUPID CRIME

TO-DAY One-eyed Johnny caught an Owl in his barn.

He nailed the living bird on the door of his house, as a robber and murderer whom it was proper to expose to the derision of all, and to leave there, so that its shrivelled remains might serve as an awful warning. Johnny was quite proud of his exploit; he laughed at the clicking of the beak, the desperate rolling of the eyes of the crucified creature; the grimacing contortions of the bird, the quivering of the wings, pierced with great nails, the impotent rage of its clutching talons, all put him in a fine humour.

The children of the neighbourhood; unconsciously cruel, as children of their age are, and crueller still when man sets them a sad example, gathered before the door and laughed likewise at the torture of the owl. Johnny told them that old Annie, his neighbour, died a fortnight ago because the Owl had come three times running to call on the roof of the house. "They are birds of misfortune, the Owls," he said; "they go into the churches by night, to drink the oil of the lamps; they go on the roof when there's anyone sick

in a house, to foretell their death ; they go and chuckle, in some hole in the belfry, when the death-knell or funeral-bell is tolled."—The children were terrified.

"Look," said the youngest, pressing himself against his brother, "how the Owl is threatening us with his great red eyes ; he must be very wicked."

"He is so ugly," said another ; "let us do something to hurt him. That will teach him to be glad because people die, and to drink the oil of the holy lamps. Poke in his eyes with this pointed stick, 'cause he's looking at us wickedly ; put this bit of glass in his claws ; he'll cut his own fingers."

And each insulted the victim, each did his best to devise some refinement of torture. Louis happened to be passing. They called him to help in the work of torture. More accessible to pity than his comrades, above all since he had been visiting Uncle Paul, Louis turned his eyes away from the horrible spectacle, and begged Johnny to kill the bird instead of making it linger in horrible torment. As Johnny would not do this he went away, sick at heart.

As he was turning away a saying of Paul's recurred to him ; something that he had said in connection with the Bats. "When the ignorant herd agree to say that a certain thing is black, it is as well to inquire, to begin with, whether by chance it isn't white."—There is Johnny, he told himself ; One-eyed Johnny, noted in the district for his gross ignorance ;

he has never opened a book and glories in it ; he can't even write his own name ; he refuses, as obstinate as a mule, to accept any kindly idea. At the present time he is exciting the children against the wretched Owl which he has just nailed to his door ; to give them some sort of reason for his barbarity he tells them it is the graveyard bird, the bird of ill-omen that brings misfortune upon people. According to him the Owl is a maleficent bird, full of malice, undeserving of pity. We must rather revenge ourselves on its wickedness, make it suffer sorely to serve as an example to others, destroy it without mercy. And if by chance it were just the contrary ! If the Owl were an inoffensive creature, even perhaps very useful, and worthy of our protection ! I must find out !

That evening, at Uncle Paul's, this was his first question. By the description which Louis gave him Paul quickly recognized the bird.

PAUL.—The bird that Johnny thought it his duty to nail alive on his door is the White Barn-Owl, Belfry Owl or Screech-Owl. This unhappy creature did not in the least deserve the hideous treatment it received. I pity it for having fallen into the hands of a man whose ignorance made him cruel. Stupid and ill-natured, they say of such a man, and it is quite true. A man who knows nothing is coldly cruel ; but if he obeys stupid ideas he is ferocious. Extravagant rumours are repeated that are by no means favour-



A CRUEL AND STUPID ACT.

To face p. 100.

able to the Screech-Owl; Johnny repeated them, having got them from someone else, and in his turn passed them on to the rascals who wanted to put out the bird's eyes. It is not true that the bird goes into the churches to drink the oil of the lamp that burns day and night before the sanctuary; it is not true that it rejoices when the death-bell tolls; it is not true that its cry, on the roof of a house, announces the approaching death of one of its inmates. The tales of its malign influence, its lugubrious prophecies, are false, and to put the slightest faith in such absurd tales is to abdicate our common sense. Our destinies, my dear boys, are in the hands of God; He alone knows when our last hour will strike. Let us pity the feeble-minded people who believe that the Owl knows the great secret of our end; let us pity them, but let us never, never insult reason by believing that an Owl, expressing, after its manner, on the housetop, its joy in having captured a mouse, is announcing in lugubrious tones the inexorable decrees of Destiny. Uncle Paul's nephews need linger no longer over such superstitions. Let us proceed.

What would you say of Johnny if he had taken it into his head to put his cat to death by nailing it to the door by its four paws?

LOUIS.—I should say that he had lost his senses, and that if the rats ate him up he would thoroughly deserve it!

PAUL.—What you have seen amounts to much the

same thing ; he was torturing one of the best destroyers of mice ; a bird in structure, but a cat in its habits. The Barn-Owl had gone into the barn to guard the poor man's sacks of corn against the rats ; but Johnny, influenced by superstitious hatred and ignorant of the services rendered by the Owl, made haste to nail the precious bird against his door.

By what singular perversity of mind are men, in general, moved to destroy the animals that help us most ? Almost all our auxiliaries are persecuted. Their good will must be very great, that our bad treatment of them has not driven them for ever from our crops and our dwellings. The Bats deliver us from a host of enemies : they are outlaws. The Mole and the Shrew-mouse purge the soil of vermin ; the Hedgehog makes war upon vipers and cockchafer grubs ; the Screech-Owl and many other night-birds are splendid rat-killers : and all are outlawed. Others too, of which I shall tell you later, do the most useful work for us : they are all outlawed, all outcast. They are ugly, folks say ; and without other excuse, they kill them. But O, you blind slayers, cannot you after all understand that you are sacrificing your own defenders to a repugnance that has nothing to justify it ? You complain of the rats, and you nail the Barn-Owl to your door, leaving its carcass, a hideous trophy, to shrivel in the sun ! You complain of the white worm, and you crush the Mole to death whenever your spade brings it to the light ! You

disembowel the Hedgehog,™ and set your dogs upon it, merely for a jest ! You complain of the ravages of moths and weevils in your granaries, and if the Bat falls into your hands how rarely you are merciful ! You complain of your lot, and if any seek to defend you, you reward them with execration ! Poor blind creatures, poor mistaken murderers !

Even in his own interests, Johnny has done a pitiable thing ; more pitiable still in respect of the suffering inflicted on the bird. It is the act not of a man, but of a brute, to take pleasure in torturing an animal. It is an impious act, severely reprov'd by morality ; ignorance explains it, but cannot excuse it. If the creature is harmful let us get rid of it by killing it, but never let us cause needless suffering ; never inflict pain for the sake of inflicting pain. To do so would dry up within us one of the noblest of feelings—compassion ; to arouse ferocious instincts which too often lead to terrible and criminal consequences. The man who delights in torturing beasts cannot feel compassion for the misery of his fellows ; he has a hard heart, inclined to evil. How I pity the poor children who laughed as they witnessed the horrible torture of the Owl, and who, incited by the man's example, were ready to put out the wretched bird's eyes ! Take care, and let your parents beware ; there is in you the seed of the criminal.

XII

NOCTURNAL BIRDS OF PREY

PAUL.—The *Barn-Owl*, the *Long-Eared Owl*, the *Tawny* or *Brown Owl* and other similar species are known under the general name of nocturnal birds of prey. They are called birds of prey because they live on the fruits of their hunting, consisting chiefly of rodents, such as rats, common mice, field-mice, shrew-mice, etc. They are among the birds what the cat is among the mammals : ardent destroyers of that small furry game of which the mouse is the example most familiar to you. In the French language this similarity of habits was long ago recognized in the term *chat-huant* by which some of the Owls are known : *le chat-huant*, the “cat that hoots.” They are nocturnal : in other words, they remain hidden by day in some dark retreat, whence they emerge only at nightfall, to hunt in the twilight or the moonlight or the darkness of moonless nights.

Their eyes are very large and very round, and both are situated in front, instead of being set one on each side of the head. A wide circle of feathers encircles them. These enormous eyes are necessitated

by the birds' nocturnal habits. Having to find their prey in a very faint light, their eyes must, in order to see it distinctly, receive as much light as possible, and must therefore be very wide open.

But their great eyes, so useful by night, are a serious embarrassment in the brilliant light of day. Dazzled and blinded by the sunlight, the bird of darkness remains in some hiding-place whence he dare not emerge. If he is forced to leave it he does so with extreme caution, lest he should strike himself against the surrounding objects. His progress is hesitating ; his flights are short and slow. The other birds, creatures of broad daylight, perceive his discomfort and his timid awkwardness and readily draw near to insult him. The robin and the titmouse are the first to come hurrying up, followed by the chaffinch, the blackbird, the thrush, the jay, and many others. Perched on a branch, the bird of darkness replies to his aggressors by grotesquely swaying to and fro ; he turns his big head hither and thither and rolls his bewildered eyes. But his threats are in vain ; the smallest and feeblest birds are the most eager to torment him ; they assail him with their beaks and pluck out his feathers, but he dare not attack in return.

ÉMILE.—Just think of the cheeky titmouse and the quarrelsome robin tormenting the Owl blinded by the sun ! Do tell us, please, why are these little birds so daring ?

PAUL.—They want to avenge themselves a little on their enemy. It sometimes happens that the Owl makes a meal of them in the night, with no more scruples than if they were common mice ; so the little winged folk are delighted when by chance the nocturnal hunter strays into the broad daylight ! Their pecks fall thick as hail on the victim's back ; they deafen him with screams and cries of victory, and mocking cackles. The robin pulls out a feather, the titmouse threatens his eyes, the jay screams insults. The whole coppice is in a ferment. But on the approach of night the courage of the boldest will fail. The same little birds that baited the Owl so boldly and persistently in the daylight will flee him and fear him as soon as the darkness enables him to move about and make use of his weapons, his hooked beak and his powerful claws.

ÉMILE.—The robin does well to get out of the Owl's way when he can see plainly ; he would pay dearly for his boldness in pulling out a feather !

PAUL.—Owing to the great aperture of their eyes, the nocturnal birds of prey need a faint light, like that of the evening twilight or of early dawn. They leave their retreats in search of their prey at the beginning or the end of night. It is then that their hunting is most fruitful, for they find their little victims asleep or drowsy. The nights of moonlight are the best of all, nights of joy and plenty, of protracted hunting, when they feast royally. But if the moon is absent

they have but an hour at nightfall and an hour before dawn¹ in which to seek their food.

Such brief periods of hunting expose them to lengthy fasts. But how they hunt, how they gorge themselves when the game is abundant!

ÉMILE.—They are very silly to fast; in their place I would hunt all night, even when there was no moon.

PAUL.—You say that because you think the Owl can see plainly in the darkest night. This is a mistake. To see is not merely to turn our eyes toward the objects to be seen; it is to receive within our eyes the light reflected from those objects. In vision nothing comes from ourselves; all comes from the thing seen. Using the words in their natural sense, we do not “cast a glance” at the object regarded; it is the object itself that throws its light toward us; if it sends none it is for that very reason invisible. And what is true of man is true of all the animals. None, absolutely none can see in the absence of light.

LOUIS.—I always thought cats could see in the most absolute darkness.

PAUL.—Others think so too, but quite wrongly. The cat is no more able than other animals to distinguish objects if there is a total absence of light. It has, I admit, an advantage over us; its large

¹ As I translate this passage, six hours after the winter sunset, the owls are squeaking and hooting all round the house. It is a moonless night, but the stars are brilliant. In winter the comparative scarcity of game seems in our climate to bring the owls out during almost all hours of the night.—Tr.

eyes, whose aperture it can contract and almost close when it is exposed to a light so brilliant as to be dazzling, or enlarge, to receive more abundantly the faint rays reflected by objects in a dark place : its large eyes, I repeat, enable it to see its way in places where our less well-equipped eyes would perceive nothing but impenetrable darkness. But such darkness is not really absolute ; the cat perceives a glimmer of light, sufficient for its more primitive vision. If there is an absolute absence of light the cat strains her eyes in vain ; she sees nothing, absolutely nothing. In this respect the nocturnal birds are no different ; their large eyes, made to see in a faint light, can no longer see if the night is very dark indeed.

Let us follow the Owl in its nocturnal expedition. The moment is propitious ; the air is still and the moon is shining ; the hunt is up. It opens with a lugubrious war-cry. At the sound of this abhorrent voice the titmouse feels hardly safe in the deepest hollow of his tree ; the robin trembles under the dense foliage ; the chaffinch loses its head with fright. God of the weak, God of the little birds, protect them ! Let not the Owl catch sight of them, still quivering, as she must be, with the insults of the day ! Let the rapacious bird seek another way ! She leaves the copse ; she skims the open country, the fields and meadows ; she inspects the furrows in which the harvest-mouse cowers, the grassy sward in which the field-mouse burrows, the tumble-down outhouses where

the rats and mice are scampering. Her flight is silent; her soft wings divide the air without the slightest sound, lest the alarm should be given to the victims. This silent flight is due to the structure of the feathers, which are silky and finely divided. Nothing betrays her sudden advent; her prey is seized even before it suspects the presence of the enemy. On the other hand, a sense of hearing of



FEET OF NOCTURNAL BIRDS OF PREY.

a, Long-eared Owl; *b*, Snowy Owl; *c*, Barn-Owl.

rare subtlety warns the Owl of all that is going on around her; her wide, deep ears detect the merest rustle of the field-mouse under the grasses. Let a harvest-mouse nibble but a root-fibre, a grain of corn, and the night-bird, warned of its presence by the mere sound of its incisors, falls upon it forthwith.

The prey is seized in the Owl's two powerful feet, warmly gloved with down to the root of the claws.

There are four toes to the foot, three of which commonly point forwards and one backwards; but

by a privilege peculiar to the nocturnal birds of prey, one of the fore toes is movable and can be turned backwards, so that the foot is divided into two pairs of toes of equal strength when the bird wishes to grip, as in a vice, the branch on which it perches or the struggling victim. One blow of the beak fractures the skull of the animal captured. This beak is short and strongly hooked. The two mandibles possess great mobility, which enables them, by striking against one another, to emit a rapid chattering sound, a clicking by which the bird expresses its anger or fear. At the moment of swallowing the prey they open, revealing a terrible orifice and a gullet of unusual width. When they open to their full extent the prey, first kneaded between the claws, disappears whole as though engulfed. All is swallowed, bones and fur included. Nothing is left of the mouse, not even the skin. Rarely does a single capture suffice, so the hunt continues. A few common mice go to join the harvest-mouse, all killed by a blow of the beak on the head, all swallowed whole, without being broken up. If some large beetle should present itself the bird will not disdain it. It is a small mouthful, but highly flavoured, spiced with peculiar aromatic essences which will act as digestives. Replete at length, the Owl regains her dark retreat in some crannied rock, some hollow tree, or the roof of a barn or deserted house.

Now the delicate process of digestion is accomplished

Motionless in the depth of her peaceful solitude, the bird gently closes her eyes, goes over in her mind the feats she has just performed, meditates others for the morrow, retires into herself, and slumbers. Nevertheless, the stomach is at work. The food swallowed has to be separated into two portions: the truly nutritious portion and the valueless. With the solvent fluid that oozes from its walls the stomach strips the skin from the flesh and the flesh from the bones and performs the delicate work of separation. The liquefied flesh disappears to form blood; a shapeless mass remains, composed of the skins, turned inside out, and retaining their fur, bones as clean as though scraped with a knife, and the carapaces of beetles emptied of their contents. This clogging mass could not enter into the digestive passages without danger. How can the bird get rid of it? Let us wait.—Ah, now the Owl is waking! Grotesque shruggings of the body tell of an uneasy stomach; the efforts are redoubled; something rises through the outstretched throat, the beak opens, and the thing is done; a pellet rolls to the ground, comprising the skins, bones, wing-covers, fur and feathers, in fact all the materials that digestion could not transform. All nocturnal birds of prey have this abject fashion of clearing the stomach; they vomit, in the form of pellets, the innutritious remains of the prey swallowed entire. If ever you have the opportunity, examine the approach to the Owl's home; the pellets of small bones and fur

will tell you what a number of mice and rodents of every kind the Owl rids us of.

LOUIS.—Yes. I've seen those pellets ; I've seen them near a rock all whitened with birds' droppings.

PAUL.—You may be sure some Owl had her home there ; the pellets and the droppings were hers.

XIII

RATS AND MICE

PAUL.—Let us return for a moment to the Rodents, the usual prey of the nocturnal birds. You are far from familiar with all of them, yet we ought not to be ignorant of them, for while some are useful to us, as the Hare and the Rabbit, others, and in greater numbers, are very harmful to us. You will recollect the two pairs of incisors, so long and with such sharp cutting edges, of which I spoke to you in connection with the Rabbit's jaws. All the Rodents have such teeth. To keep them well whetted and to prevent them from growing too long and crossing one another, which would leave the animal incapable of feeding itself, the rodent has to wear them down by continual friction, as they continue to grow. There is, in a sense, no rest for these terrible incisors ; they must always have something to nibble at, no matter what, no matter when ; consequently the injury they do us is far greater than we could imagine from the size of the animal. What actual food does a mouse need ? Little enough, to be sure ; the mouse is so tiny ; a nut would plump it out. Do not imagine, however,

that it confines the day's depredations to a single nut. Having eaten the nut it will gnaw a hole in a sack, cut a bit of cloth to pieces, nibble at a book, bore a hole through a plank, merely to sharpen its teeth. Such damage as the rat and the mouse do within doors the other rodents do in the fields. We ought to know something of all these indefatigable destroyers.

JULES.—I don't even know the field-mouse and the harvest-mouse which you mentioned when you were telling us of the nocturnal birds.

ÉMILE.—I know the rat and the mouse ; no more.

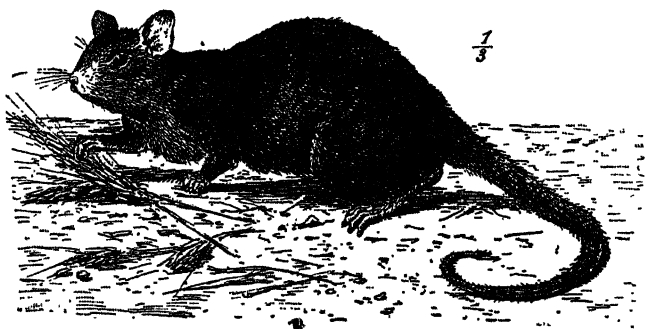
PAUL.—Even so, I very much doubt whether you know what the common Rat is. I will begin with that.

The *British* or *Black Rat* is, as regards its size, more than twice as large as the mouse. Its fur is almost black on the back and side, ash-grey on the belly. It lives in barns, thatched roofs and deserted buildings. If it cannot find a convenient shelter it digs itself a burrow. It is of foreign origin ; it is believed to have come from Asia in the train of the armies that took part in the Crusades. Nowadays we hear little of this rat ; another rodent has come on the scene, the *Norway Rat*,¹ which, stronger than the Black Rat, has waged a war of extermination against the latter and has ended by almost destroying the species. We have gained nothing by the change ; quite the contrary ; the Norway Rat is the more to

¹ In France, the *Common Rat*.—Tr.

be feared. The true or Black Rat is now, therefore, somewhat rare, above all where the Norway Rat is abundant, which is the reason why I doubt if any of you know it. The animal you call the Rat is commonly called the Norway Rat. The true Rat you will easily recognize if you remember its black colour.

The *Mouse* is much more familiar to you. It has been known from all time, by everybody. Need I



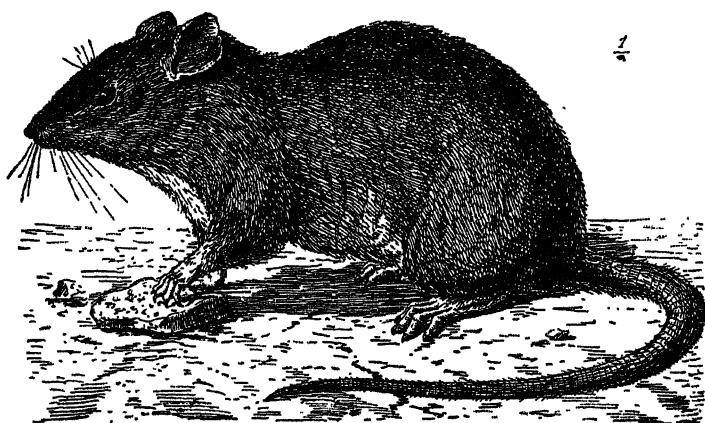
COMMON OR BLACK RAT.

describe this little rodent, so nimble and cunning, timid to excess, that enters its hole at the slightest alarm?

JULES.—We all know the little mouse quite well.

PAUL.—The *Norway, Brown or Sewer Rat*, is the largest and most formidable of all the rats found in Europe. It sometimes reaches a length of twelve inches, without counting the tail, which is scaly, like that of the mouse, and a little shorter than the body. When it has reached its full growth it is powerful enough

to hold its own with the cat. Its presence in Europe dates back only to the middle of the eighteenth century ; it seems, despite its name, to have been brought from India in the holds of ships, which it commonly infests. It is now distributed over all parts of the world. Its fur is a reddish-brown above and ash-grey below.



NORWAY, BROWN OR SEWER RAT.

The Norway Rats frequent warehouses, cellars, sewers, rubbish-shoots, slaughter-houses, etc. All is grist to the mill of these bold and filthy creatures, which will even venture to use their voracious teeth on a sleeping man. In the large towns they multiply to the point of causing serious anxiety. In the neighbourhood of the knackers' yards of Montfauçon, in Paris, the ground is so undermined by their innumerable holes that the houses built on this unreliable soil

are in danger of sinking. To preserve them from ruin the foundations have to be protected from the rats by means of a deep barrier of broken bottles.

JULES.—Why have so many rats been attracted to those parts ?

PAUL.—By the abundance of food, by the carcasses of the slaughtered horses. In a single night, if they are left in the yards, the carcasses are stripped to the bones. During the hard frosts, if the hide is not removed in time, the rats will get into the carcass, and remain there, eating all the flesh, and when the thaw comes and the workmen come to flay the horse they find nothing inside its skin but a tribe of rats swarming amidst the bones of a skeleton horse !

ÉMILE.—Have they no cats to protect themselves from the rats ?

PAUL.—Cats ! The rats would eat them alive, my boy, and make short work of them, too ! They have something better : they have dogs, terriers and bulldogs, which track them in the sewers with astonishing skill and break their backs with a single snap of the teeth. The bulldog is the cat for this sort of mouse. The hunts in the sewers have to be often repeated, for the rats multiply with frightful rapidity, and, if precautions were not taken, sooner or later the city would be endangered : the horrible beast, strong in its numbers, would eat up Paris.¹ In December 1849

¹ Poison-gas is now being used to exterminate rats where their numbers are menacing.—TR.

two hundred and fifty thousand rats were destroyed in a few days as the result of a great rat-hunt.

In the country the rat frequents the banks of dirty streams ; it makes its way into kitchens and invades the poultry-houses and rabbit-warrens by tunnelling under the walls. It haunts cellars and stables, but rarely makes its way into granaries, doubtless because of its predilection for liquid filth and refuse, which it finds only on the ground or in cellars and sewers. It eats eggs and attacks chickens, and is even bold enough to kill grown fowls and rabbits. If animal food, which it prefers, is unobtainable, it will eat grain and vegetables of any kind. No foodstuffs are respected by this filthy glutton. To rid ourselves of it we can hardly count on the cat, which as a rule dare not attack it ; nor are the nocturnal birds of prey sufficiently powerful to cope with it, excepting the Eagle Owl, which is a very rare bird. The only resources left are traps and poison.

The *Wood-* or *Field-Mouse* is a little larger than the Common Mouse. Its fur, rather like that of the rat, is reddish-brown above and white beneath. Its eyes are large and prominent, its ears blackish, its feet white. The tail, very long, as in the mouse, is slightly hairy, and the latter half of it is black. The Wood-mouse frequents the woods, hedges, fields and gardens. It cuts through the stems of corn to get at the ear, of which it will nibble a few grains and scatter the rest uneaten ; it will unearth seeds in order to obtain

food ; it gnaws young shoots that are just appearing, the bark of shrubs and the plants in the kitchen-garden. Its depredations are the more to be feared in that it stores up food for seasons of dearth. In hiding-places hollowed out at more than a foot below the surface, at the foot of a tree or a rock, it stores up



WOOD-MOUSE.

grain, hazel-nuts, acorns, almonds, chestnuts, and so forth, often going quite a distance in search of them. One hiding-place is not enough ; it must have several, for it is apt stupidly to forget the spot where its treasure is buried. In the winter the Wood-mice approach our houses ; they make their way into the cellars where fruit and vegetables are stored, or establish themselves, in numerous bands, in the heart of the farmer's stacks of grain.

The *Harvest-Mouse* is the smallest of our Rodents.

It is a charming little creature, smaller than the Common Mouse, of a yellowish-fawn colour, brighter on the rump and the cheeks. The belly, breast, throat and chin are a beautiful white. The tail and feet are a light yellow ; the ears, which hardly protrude from the fur of the head, are round and hairy ; the eyes



HARVEST-MOUSE AND NEST.

are prominent. The Harvest-Mouse lives exclusively in the corn-fields and feeds on the corn. After the harvest it takes refuge in the stacks, especially in stacks of oats, but never has the audacity to invade our houses. If I tell you of this gentle little Rodent it is not so much to complain of the few ears of oats of which it deprives us as to describe its nest for you.

The other Rodents rear their families either in a hole in some wall or heap of rocks or stones, or in a burrow expressly excavated. The Harvest-Mouse disdains these underground dwellings; it insists on a nest suspended in the air, like those of the birds. For this purpose it brings together several stems of growing corn, interlaces them with bits of straw, and builds, about half-way up the stalks, a nest which the birds themselves cannot surpass, as an artistic achievement. This nest is spherical, the outside woven of blades of corn and similar material, the inside lined and padded with hair. There is only a small opening in the side, which the rain cannot enter. Suspended at a height of some feet above the ground, on the flexible support of the oat-stems, it sways to and fro in the lightest breeze.

ÉMILE.—How does the little creature manage to enter and leave its nest?

PAUL.—It climbs up one of the supporting stems. It is so small that it easily can run up a cornstalk.

ÉMILE.—If I come across the Harvest-Mouse I shall not have the heart to do it any harm. Let it eat its oats in peace in its pretty nest; I shall not reproach it for doing so.

PAUL.—I have now enumerated the principal representatives of the Rat tribe in this country. They are five: the Black Rat, the Mouse, the Norway Rat, the Wood-Mouse and the Harvest-Mouse.

XIV

THE VOLES—THE HAMSTER—THE DORMOUSE

PAUL.—A second genus of Rodent now calls for our attention : that of the *Voles*, vulgarly confounded with the Rats. The Voles can easily be recognized by their short tails, which are slightly hairy.

The *Field Vole* is the size of a mouse. Its fur is yellowish in colour, mingled with grey, on the upper parts, and a dingy white underneath. The tail is only one-fourth as long as the body. The eyes are large and prominent ; the ears are round, hairy, and hardly protrude from the fur. The head is larger and blunter than that of the mouse.

When it is present in great numbers the Vole is one of the most formidable enemies of agriculture. Above all it ravages the cornfields and cuts through the stems of corn to nibble the ear. After the harvest it attacks the roots of clover and carrots, potatoes and other vegetables. In winter it burrows into the furrows to eat the seed. If the ground is frozen hard so that it cannot reach the buried grain it retires to the stacks of corn, in which it commits terrible depredations.

dations. It never enters houses. The Voles seem to migrate from one part of the country to another in colonies, when the countryside which they have ravaged can no longer nourish them; at all events, in certain years, perhaps every five or ten years, they suddenly make their appearance in innumerable bands which are a plague to the countryside invaded. Their chief destroyers are the nocturnal birds of prey, as



FIELD VOLE.



BANK VOLE.

is proved by the presence of their skulls, bones and skins in the pellets rejected by these birds after their digestive labours. A few diurnal birds of prey, more especially the buzzards, also make the Voles their prey. It is not unusual to find ten or more Voles in the crop of a buzzard.

The *Bank Vole* is a rarer species. It differs from the Field Vole in its grey and grey-black fur, its rather smaller size and its very small eyes. Above all it differs in its habits. The Field Vole lives in the fields, above all in the corn-fields; the Bank Vole in the meadows and in kitchen-gardens. It feeds on various vegetables: celery, artichokes, carrots, potatoes

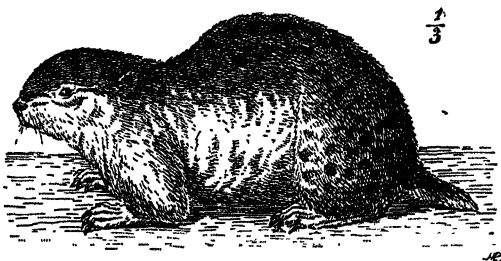
and the like. It is rarely seen out of its burrows. On account of its habit of remaining underground it is sometimes known as the *Ground Vole*.

The *Water Vole* is commonly known as the *Water-Rat*. It is easily distinguished from the Black Rat, which is the same size, by its red-brown coat, its short tail, about half the length of the body, and its larger, blunter head. It burrows into the banks of streams, ditches and marshes, where it lives chiefly on roots, without despising small fish or crayfish when it can catch them. It swims and dives admirably. Sometimes it makes its way into moist kitchen-gardens, where it commits the same depredations as the Ground Vole, and into orchards, where it gnaws the bark of young trees.

The *Lemming* is unknown in our southern countries ; it inhabits the shores of the Arctic Ocean, in Norway and Lapland. I mention it because of its curious migrations, of which the Field Vole offers a much less conspicuous example. The Lemming, with its very short, furry tail, its large head and its short, plump body, has all the appearance of a little earless rabbit. Its fur is a reddish-brown, mottled with black and brown.

On the approach of the severe winter of the North, and sometimes too without apparent cause, the Lemmings leave their usual dwelling-place, the lofty mountain-chain of Norway, to undertake a long journey to the sea. The migrant horde, composed

of thousands of Lemmings, jogs onwards, crossing all obstacles in a straight line, allowing nothing to turn it from its goal. Moving in files, one behind another, the great Swedish naturalist Linnæus describes them as tracing rectilinear and parallel furrows, two or three inches deep, at intervals of several yards. They devour everything that hinders their passage, stalk,



LEMMING.

root and leaf. Nothing diverts them from their route. If a man places himself in their way they glide between his legs. If they encounter a haystack they nibble their way through it ; if a rock, they pass round it in a semicircle and beyond it resume their direct path. If a lake lies across their route they swim across it in straight files, whatever its width. If a boat lies in their way they clamber up it and fling themselves into the water on the farther side. A turgid river will not stop them ; they throw themselves into the stream, even though all perish thereby.

ÉMILE.—They must be obstinate if they would

rather drown themselves than turn aside from their direct path !

PAUL.—Animals do sometimes exhibit such signs of persistence, of obstinacy, which to us appear inexplicable, yet which would be clearly explained if we knew the motives that actuate them. It may be that in turning aside from the direct path the Lemmings would lose their way, a way which there is nothing to indicate, on which instinct alone is their guide. But let us leave them to finish their long pilgrimage, whence very few will return, so many are the dangers and the enemies that await them on the road ; let us leave them to cross the rivers and lakes of the North, and return to the rodents that we know.

The *Hamster* is frequent in Central Europe and notably in Alsace. It is still sometimes called the *Strasbourg Marmot* or the *Rye-Pig*.¹ It is about the size of the Black Rat, but its body is more thick-set. Its tail is short and covered with hair, its fur is a reddish-brown on the back, black under the belly, with yellowish patches on the flanks, a white patch on the throat, and another on either shoulder.

The Hamsters live on roots and fruits, but above all on grain, of which they lay up large stores. Each digs itself a burrow consisting of several chambers, the most spacious of which serves as a granary. There, against the season of dearth, the Hamster stores rye and wheat, bran and peas, vetches and flax-seed.

¹ *Cochon de si gle*.

Like the mice, the Hamster stores up treasure far beyond its needs and for the mere pleasure of amassing wealth. In some of its silos as much as two hundredweight of provisions has been found. What can an animal no bigger than one's fist do with such wealth? The winter comes; the Hamster shuts itself up in its house; having food and shelter assured it grows fat and lusty. Then, if the cold is very severe, it goes to sleep, like the Marmot.



HAMSTER.

ÉMILE.—And the two hundredweight of corn, collected grain by grain?

PAUL.—It is spoiled and wasted; but this matters little to the Hamster, which begins, in the following year, to amass a fresh store. Its particular calling is above all to ravage the fields, as is proved by its heap of corn, out of all proportion to its needs. It amasses food in order to destroy it even more than to assure itself of food. Moreover, it forms an exception to the hibernating animals. In the midst of

plenty, if the winter is unusually severe, it is overcome by the same stupor that saves the Hedgehog and the Bat from death by starvation. This terrible miser has not even the excuse of need. Fortunate are those countries that have not to pay it tribute! —But we must pass on to other Rodents.

JULES.—Then there are still more of these greedy beasts?

PAUL.—They are rather like the insects: when



GARDEN DORMOUSE.

there are none left there are more to come. The world seems to have been given over as pasture to the mandibles of larvæ and the incisors of the Rodents.

The species of the *Dormouse*^{*} family live in woods and orchards and feed on fruit. These Rodents have the nimbleness, the graceful shape and the rich fur of the Squirrel. They find shelter in holes in the trees or crevices in the rocks. In the winter, when there

^{*} The name is, by derivation, not *Dor-mouse* but *Dormouse* —the Sleeper; from one of its French names.—Tr.

is no fruit for them, they are overcome by a lethargic sleep.

The true *Dormouse* is a native of Southern France, of Provence and Roussillon. It is a pretty creature, rather like the Squirrel. Its tail is long and bushy; its fur a greyish-brown on the back and whitish on the belly. By night it ravages the fruit-trees. No



TRUE DORMOUSE.

one knows better just when the pears, peaches and plums reach the point of perfect ripeness. In the evening you give a satisfied glance at your fruit: you will give them just one more day of sunshine to bring them to perfection. Next day you go to pick them; there are none left; the Dormouse has been before you.

The *Garden Dormouse* is smaller, about the size of the Black Rat. Its fur is prettily marked with russet

brown, black and white. The brown is on the upper part of the body ; the white on the belly, feet and shoulders ; the black surrounds the eyes and continues along the sides of the neck.

The Garden Dormouse is distributed all over France. It is fond of the neighbourhood of houses ; it is found in gardens, vineyards and copses. It feeds chiefly on fruit, of which it spoils great quantities, tasting first one, then another, without consuming them. When the winter comes a number of these creatures gather together in the same hole, where they sleep higgledy-piggledy, rolled into a ball in the midst of a store of walnuts, almond and hazel-nuts, which they took the precaution of collecting in due season.

ÉMILE.—But if they sleep they don't need a store of food.

PAUL.—Excuse me, my boy, they do need it, and need it sorely ; not while they sleep, but when they wake. They wake in the early spring, when the sun begins to grow warm. At this time of the year there are as yet no fruits ; and the Dormouse, which has just undergone a fast of several months' duration, must have an appetite which you can easily imagine. What would become of the poor things without their store of nuts ?

ÉMILE.—They are very prudent, these little Dormice ! They know that when their winter sleep is over they will find no fruit in the woods and orchards, and they collect and store what they will need at

that time. Why don't they make a store of pears and apples if they are so fond of them ?

PAUL.—Because apples and pears rot, while nuts keep very well.

ÉMILE.—Of course, I didn't think of that ; but the little Dormouse does.

PAUL.—The Dormouse does not think of it. It does not know that pears become rotten while nuts keep good, since it has never made an experiment ; it does not foresee the fact that when it wakes the trees, far from bearing fruit, will hardly have put forth their earliest leaves ; it does not know how long it will be before it can find a pear to nibble ; it knows nothing of all these things, which it is to experience, perhaps, for the first time. Another thinks for the Dormouse and inspires it with the prudence which makes it hide its store of nuts in some hole in a wall ; another who knows all, foresees all : God, the Father of man, who plants the pear-tree ; but the Father, too, of the little Dormouse, that so loves the pears.

XV

THE OWLS : I, THE EARED OR HORNED OWLS

PAUL.—We have just taken a rapid glance at the various Rodents which injure our crops. I will say nothing of the pretty Squirrel, a lover of nuts and beech-mast; the industrious beaver, a few rare representatives of which are found in France, on the banks of the Rhone; or the hare and rabbit, which I leave to the sportsman's guns and the trapper's gin. Who will protect the fields from the disastrous teeth of the others: the rats, voles and field-mice? Who will set a limit to their excessive multiplication? In our dwelling-houses we have the cat; out of doors we have the auxiliary army of the feathered cats, the nocturnal birds of prey. I will divide these into two categories in order to make it easier for you to recognize the different species. Those of one class have the head adorned with two tufts of feathers like long ears; these are the *Eared Owls*; the others have no such ornament: I shall call them the *Smooth-headed Owls*.¹

¹ In French the eared owls are known as *hiboux*, the smooth-headed owls as *chouettes*.—Tr.

THE OWLS: I. THE EARED OWLS 133

The largest and strongest of the Owls is the *Great Long-eared Owl* or *Eagle Owl*.¹ "He is readily distinguished," says Buffon, "by his large body, his great head, his deep, wide ear-cavities, and the two plumes that surmount his head, which reach a length of two and a half inches or more; by his short, black, hooked beak; by his great, fixed, transparent eyes, the wide black pupils surrounded by an orange-yellow ring; by his face, surrounded by hairs, or rather little white feathers decomposed, as it were, into hair, which are bordered by a circumference of other small, curling feathers; by his black talons, very powerful and sharply curved; by his very short neck; by his plumage, a tawny brown spotted with black and yellow on the back; by his feet, covered to the claws with dense down and rusty-brown feathers; and lastly by his terrifying cry—*hooihoo*, *hoohoo*, *hoohoo*, *houhou*—which he utters in the stillness of the night when all other creatures are silent. It is then that he awakens them, harries and pursues them, and seizes upon them, to bear them off to the cave that serves as his retreat. He lives only in the rocks or the abandoned towers in the mountains; he rarely descends into the plain and does not care to perch on the trees, but on lonely churches and old castles. His ordinary game consists of young hares and rabbits, field-mice and rats, the flesh of which he digests, and

¹ In France known as the *Grand-Duc*; the other eared owls are the *Moyen Duc* and the *Petit Duc* (Scops).—Tr.

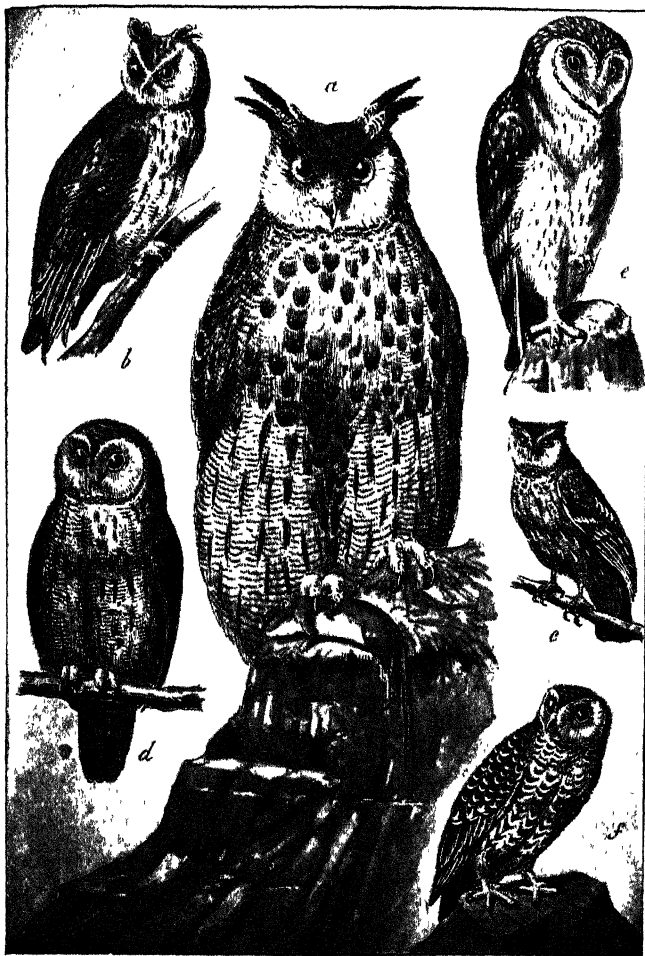
vomits the skin, fur and bones in rounded pellets. The Eagle Owl nests in caverns of the rocks or gaps in the walls of old, lofty buildings. His nest is almost three feet in diameter. It consists of small branches of dead wood interlaced with supple roots and lined with leaves. One or two eggs only are found in the nest, or rarely three. The colour of the eggs depends a little on that of the bird's plumage; their size exceeds that of a hen's egg."

ÉMILE.—Are those things like horns which the Eagle Owl has on his head his ears?

PAUL.—No; they are ornamental plumes which give the bird a fierce aspect. His ears are invisible, hidden by his plumage. They are very large and deep; the Eagle Owl has an unusually keen sense of hearing.

LOUIS.—The Eagle Owl eats rats and field-mice, for which I am grateful to him; but he eats leverets and young rabbits too. Isn't that a pity?

PAUL.—As far as the sportsman and the trapper are concerned, it may be; but as regards the farmer it is another matter. The hare and the rabbit, remember, belong to the order of Rodents. They have indefatigable incisors, which spare nothing. If they were to multiply in peace they would seriously threaten our crops. History tells us of countries so ravaged by rabbits that an army had to be sent to help the inhabitants to exterminate the ravenous vermin. We shall never come to such a pass as that,



THE OWLS.

a, Eagle Owl. *b*, Long-eared Owl. *c*, Scops, or Short-eared Owl.
d, Tawny Owl. *e*, Barn-Owl. *f*, Little Owl.

($\frac{1}{2}$ natural size.)

I am sure ; but after all it is just as well that the Owl, together with the sportsman and the trapper, should keep these species within prudent limits. However, the Eagle Owl is everywhere a very rare bird.¹ These big eaters need a very extensive hunting-ground if they are to avoid treading on each other's preserves.

I have a more serious complaint against the Eagle Owl. When his favourite game is lacking—field-mice, voles and rats—he falls upon the bats, adders, frogs, lizards and toads, thus depriving us of some of our friends and helpers. Once for all, remember that although some of our helpers are irreproachable, there are many others which from our point of view are guilty of many misdeeds. Remember the Mole, which upturns the soil and cuts through the roots to destroy the cockchafer grubs. No animal troubles its head about man, excepting the Dog, our friend rather than our servant ; none concerns itself with our interests ; all work for themselves and their families. If it is their instinct to destroy only the species which are harmful to us, so much the better ; they are friends *par excellence* ; but if their tastes lead them to hunt independently both the species that are noxious to us and those that are useful, we must weigh the good they do us against the harm. If the benefits tip the scale, let us respect the creature : it is a friend ; if

¹ In England it is a rare wanderer ; the evidence as to its nesting here is doubtful.—Tr.

the depredations, let us declare war upon it: it is a despoiler. The Eagle Owl scours the fields for the formidable misers of grain, the hamsters and the field-mice; in the gardens he pounces on the dormouse, and round our dwelling-houses he kills the mouse, the rat and even the horrible sewer-rat. This is the evidence for his defence. The sportsman and the trapper accuse him of taking a few young rabbits, heedlessly browsing on the wild thyme in the moonlight; a few leverets are deprived of the honour of the roasting-jack or the oven; while I myself accuse him of a crime in giving his young the valuable toad, the useful adder and the lizard, a slayer of grasshoppers. So much for the indictment. But when the balance is struck the services of the bird outweigh the offences, and I declare on my heart and conscience that the Eagle Owl deserves well of the farmer.

JULES.—So we all say.

PAUL.—The common *Long-eared Owl* is very like the Eagle Owl, but is very much smaller. It is hardly larger than a crow, while the other is as big as a goose. In many European countries it is the commonest of the Owls. In the summer nights it may be heard incessantly repeating its prolonged, groaning cry—*klu, klu*—which may be heard a long way off. When it takes to its wings it utters a sort of sharp sigh, doubtless caused by the expulsion of air from its lungs by the effort of the wings at the moment of taking flight. In the daylight, in the presence of man

and other birds, the Owl has an astonished and comical expression. It clatters its beak, tramples with its feet and nods its great head up and down with sudden movements, or turns it from side to side. If it is attacked by too powerful an enemy it lies on its back and threatens with its claws and beak.

It inhabits ruined buildings, crannies in rocks and hollow tree-trunks. It rarely takes the pains to build itself a nest; it prefers to restore, for its own use, the abandoned nest of a magpie or a buzzard. In this nest it lays four or five white spherical eggs. I may remark, in passing, that the eggs of the nocturnal birds of prey are not oval, like those of the hen, but nearly spherical. The Long-eared Owl, as a hunter, has the same habits as the Eagle Owl; the same predilection for the rodents—field-mice, rats, mice and voles; the same capture of young rabbits, for which the Owl patiently lies in wait outside the burrow.

The *Short-eared Owl* resembles the Long-eared Owl in its plumage and its dimensions. Its two plumes or "ears" are very short, and the bird rarely erects them as do the two previous species. On account of the inconspicuous nature of this distinguishing mark of the Eared Owls the Short-eared Owl is often confused with the Smooth-headed Owls. This species seldom approaches houses; it prefers rocks and quarries and solitary ruined houses. It builds no nest and contents itself with laying its two or three

eggs in some hole in a wall or cliff. These eggs are white, round and glossy, about the size of the pigeon's eggs. Its usual cry is a gentle *goo* ; if rain is on the way it says *goyou*. Its principal diet consists of field-mice and voles.

The *Scops* or *Little-eared Owl* is about the size of a blackbird. Its plumage is an ashen grey mingled with reddish-brown, varied by little longitudinal streaks of black and fine transversal lines of grey. It is the smallest and prettiest of all the Owls. When they are well erected on its head its fine ear-tufts give it a resolute, combative air that matches well its ardour for the chase.

ÉMILE.—In the picture the tufts are not erect.

PAUL.—No ; the bird is represented in one of its quiet moments ; it is not preoccupied, and there is nothing in the outside world to attract its attention. It is withdrawn into itself, dreaming of the tasty morsels of its last meal ; it is digesting. But let only a mouse come scrabbling in the neighbourhood ; in a moment the *Scops* ruffles up the feathers of its face, a first sign of attention ; it then erects and expands its ear-tufts, a sign that its attention is strained to the highest pitch. It hears and understands : the bird dashes off and the mouse is captured.

The small rodents are its favourite game. To facilitate their digestion it spices them with *Scarabæi*, especially with cockchafers. When furred game fails it makes a necessity of virtue and frugally contents

itself with insects, hoping soon to return to the capture of mice. The Scops is a traveller, a migrant. It assembles in flocks, sometimes to escape the winter in a warmer climate, sometimes to search for districts where game is abundant, when that which it inhabits no longer affords it sufficient resources. If the field-mice begin to multiply in any part of the country, and to ravage the corn and the forage-plants, the Scops Owls have news of it ; I know not by what means. They spread the good news, take counsel together, and set out for the devastated territory, where an incomparable feast awaits them. With such ardour do they apply themselves to the task of extermination that in a few weeks' time the fields are cleared of vermin.

The Scops nests in hollow trees and crannies of the rocks. Its eggs, two to four in number, are of a glistening white.

XVI

THE OWLS : II. THE SMOOTH-HEADED OWLS

PAUL.—Now I must tell you something of the Owls that have no ear-tufts or “horns.” The largest is the *Tawny*, *Brown*, or *Wood Owl*, or *Owlet*, about the size of the domestic pullet. In the male, the ground colour inclines to grey ; in the female it is a reddish-brown ; a difference which sometimes causes them to be taken for different species. On this background are sprinkled longitudinal brown streaks or patches, less numerous on the breast and belly, of a whitish colour. The wings are marked with several broad, round, white patches. The head is very large and well rounded ; the face is flat and as it were sunken amidst the surrounding plumage. The eyes, also sunken, are brown and surrounded by small grey feathers.

Of the French names of this Owl—*Hulotte*, *Chat-huant*—the first is derived from the Latin *ululare*, to howl like a wolf ; the second from the French verb *huer*, which expresses a similar idea. (The English name *Owlet* is of similar derivation.) The *Owlet* is,

in fact, remarkable for its cry, which is not at all unlike the howling of the wolf.

When, at the close of a dark winter day, the north-east wind is driving the snow and moaning among the trees, a terrible cry, lugubriously prolonged, rises from the dark fastnesses of the woods : *Huhu, huhu, huhu-u !* There, in the lonely cottage, the mother crosses herself in her fear, and the children press close against her, saying : “ The Wolf is there ! ”—But no, good people, it is not the wolf ; it is the Owlet hooting, emitting its war-cry from the vantage of some cavernous oak and preparing to start on its nightly rounds.

During the spring and summer the Brown Owl lives in the woods. It hunts, for preference, field-mice and voles, which it swallows whole, afterwards ejecting the skin and bones, rolled into pellets. The little birds that pursue it with such fury in the daytime, when they have the luck to surprise it while the sun is shining, are defenceless before its beak if the night-bird succeeds in surprising them, terrifying them with its terrible *who-hoo !* Keep very still in your hiding-places, chaffinches, robins and tits ! and beware of allowing your terror to betray you ; let the Owlet hoot in vain, or you are lost !

If its hunting in the countryside is unfruitful, the Brown Owl approaches the dwellings of man and enters the farm-yards and the barns, there to do the work of the cat and earn the name of *chat-huant*, by

which it is known in France. In patience and address it rivals Raminagobris himself when it comes to lying in wait for, and pouncing on, rats and mice. It is a guest whom we should leave unmolested when hunger induces it to visit our barns and granaries. When it has gone its rounds it returns to the woods in the early dawn, hides itself in the densest thicket, or the trees whose foliage is thickest, and there remains all day, motionless and silent. In the winter its home is always the hollow of a tree. It lays its eggs in the deserted nests of magpies, rooks, buzzards and kestrels ; these eggs, a dingy grey in hue, are about the size of a bantam's egg, but rounder.

The *Barn Owl*, *Church Owl*, or *White Owl* is a bird of clumsy build, slightly smaller than the Brown Owl. Its plumage is not lacking in beauty. It is a rusty brown on the back, with undulating markings of grey and brown, prettily picked out with white spots having a dark speck on either side ; it is white on the breast and belly, with or without brown streaks. The eyes are deep-set and surrounded by a regular circle of fine, white feathers, almost like fur ; a narrow, russet border frames the face. The beak is whitish ; the feet are gloved only in a white down, very short, through which the pink flesh appears. This bird has nothing of the proud aspect of the Eagle Owl and the Scops ; its bearing is clumsy, embarrassed, almost shamefaced. A hunched back, drooping wings, a frowning countenance, a mournful gaze, and long,



OWL SURPRISED BY SMALL BIRDS.

To face p. 142.

shambling legs—such is the Barn Owl in repose. As though to put the finishing touch to its uncouthness, the bird, if anything disturbs or alarms it, sways absurdly from side to side with haggard eyes and wings a little raised.

JULES.—Why does it sway to and fro ?

PAUL.—Doubtless to frighten its enemy. In moments of danger, too, the Barn Owl utters a harsh, croaking cry—*grei, grei, krei*—which often impresses the aggressor. Its habitual cry, in the silence of the night, is a lugubrious sigh or moan—*kei, kei, keu, kiu*—like the snoring of a man asleep with his mouth open. Remember that these alarming cries are uttered in the darkness of the night, often in the neighbourhood of churches and graveyards, and you will understand why the innocent Barn Owl has contrived to terrify children, and even credulous men and women ; you will understand, too, why it is reputed to be a funereal bird, a harbinger of death, whose cry calls to the churchyard one of the inmates of the house on which it perches. One of its French names—*l'effraie*—alludes to these superstitious terrors ; it means the bird that frightens (*effraye*) with its nocturnal chant folks who are stupid enough to believe in ghosts and witches.

JULES.—It can call on our roof as much as it likes ; the Barn Owl won't frighten me.

PAUL.—It wouldn't frighten anyone if people would only listen to common sense instead of giving credence to ridiculous tales. Fear, like cruelty, is the child of

ignorance. Form your reason, accustom yourself to see things as they are, and foolish fears will evaporate.

The Barn Owl is also known as the *Church Owl*, because it inhabits the recesses of belfries and ancient churches. Sometimes it may enter a church to hunt the mice. Those who first saw the bird of ill fame near the altar did not fail to accuse it of sacrilege; they charged it with drinking the oil of the lamp, or rather of eating it when congealed by the cold. But the accusers convict themselves of untruth, for the oil cannot congeal in a lamp that is perpetually burning. However, they do not trouble to look too closely when a chance occurs of blackening the reputation of the accursed bird; and I might protest in vain, for they would still regard the Owl as a profaner of the holy lamps; the Provençal would continue to call it "the oil-drinker," *béou l'oli*.

In reality this Owl feeds on rats and mice, which it captures either in the churches or in our barns and granaries; and on field-mice, voles and dormice, which it hunts in field and garden. Those are assuredly services which ought to outweigh its false reputation and win the Barn Owl the esteem and protection of all. Can we persuade people to withdraw a condemnation which is absolutely without excuse? I greatly doubt it. Superstition is too tenacious ever to lack its One-eyed Jeans, who nail the living Owl to the barn or farmhouse door.

The Barn Owl has a liking for inhabited localities.

OWLS : II. SMOOTH-HEADED OWLS 145

The roofs of churches, the tops of belfries and high towers are its favourite dwelling-places. All day long it remains hidden in some dark hole, whence it emerges only after sunset. Its manner of taking flight is worth recording. It lets itself fall from the top of its tower like a lifeless lump, spreading its wings only after a long, perpendicular fall. It flies a little sideways, without a sound, as though borne by the wind. It lays its eggs in such holes as it finds in ruined buildings, in the cavities of decaying trees, sometimes on the rafters of a barn. No nest is made to receive the eggs, which are laid on the selected spot without leaves, roots, or down to form a bed. They are produced about the end of March. The clutch comprises five or six white eggs, remarkable for their elongated oval form, which is exceptional in the Owls. The young birds, with their great eyes, voracious beak, and ruffled feathers, like rumpled cotton-wool, are the ugliest creatures imaginable. The mother feeds them on insects and quartered mice.

The smallest of our owls is the *Little Owl*.¹ Like the Scops, it is about the size of a blackbird. Its colour is a dark brown, with large spots, round and oval. The throat is white ; the tail is crossed by four narrow white bands. The Little Owl has a light, nimble bearing ; it can see by daylight far better than the other nocturnal birds, so that it sometimes indulges

¹ The Scops is usually, in England, found to be smaller than the Little Owl. Mr. T. A. Coward gives the length of Scops as $7\frac{1}{2}$ inches ; of the Little Owl, 9 inches.—TR.

in hunting little birds, but very rarely with success. When it has the good fortune to capture one it plucks it very neatly before eating it, instead of following the custom of the larger Owls, which would swallow it, feathers and all, vomiting later. Its hunting is far more effective in the case of field-mice and the common mouse, which it tears into quarters. The other Owls make only one mouthful of a mouse; the Little Owl breaks it up, perhaps to savour it better, as a refined gourmand. To express astonishment, surprise, fear, the Barn Owl sways to and fro in a comical fashion; the Little Owl behaves differently. It bends its legs, crouches down, and then suddenly stands erect, elongating its neck and turning its head now to the right, now to the left. You would think it was actuated by a spring. This gesture is repeated several times over, each time with a clatter of the bill. When flying its ordinary cry is *poo, poo, poo*; when perching it says *emmeh, edmeh*, several times over, in an almost human voice.

The Little Owl lives in ruins and quarries, never in hollow trees. It frequents the roofs of churches and village houses. Its nest is a hole in a rock or wall. In it four or five rounded eggs are laid, white with a few rusty spots.

XVII

THE EAGLE

PAUL.—If I were to propose to tell you the history of the birds as the scientist understands it, in his general survey, instead of making you acquainted, as is my principal purpose, with the species that are of service to the farmer, I should have to begin with the birds that hunt by day, and leave till afterwards those that hunt by night: the Eagle, the Falcon, the Sparrowhawk would have to take precedence of the Eagle Owl, the Barn Owl, the Tawny Owl. Why? you will ask me. I should be puzzled to give you a satisfactory reply. In the place of a better, let us be content with this: the first hunt by day and the second by night. But the Eagle and the rest live at our expense, while the Owls render us incontestable service by opposing themselves to the disastrous multiplication of the Rodents. Consequently, in the matter of utility, the first place rightly belongs to the nocturnal birds.

But this order of precedence is contrary to custom, which places the Eagle at the head of the birds; to our ordinary custom as well as that of the scientist.

Do we not say of the Eagle that it is the king of the birds? Why do we give this title to the ferocious bandit, the lamb-killer? I should ask myself in vain but that I am aware of the human tendency to glorify brute force, even though one be its victim. You will learn only too soon, my poor children, at your own cost and peril, that wholesale rapine finds in us no lack of baseness to excuse it or even glorify it, while the profitable labour that is useful to all is apt to leave us cold or even contemptuous. The Falcon ravages our poultry-runs and drinks the blood of our pigeons; we hold it in high esteem, calling it a noble bird. The Barn Owl defends us against the rats and watches over the safety of our harvests; it is held in abomination and called an ignoble bird. Shall we never learn to judge beasts and men by their real worth, their real utility? Let us hope that since so many fine thinkers have striven, are still striving, and will always strive to bring about this miracle, you too will one day do the same, if by God's grace you are able to do so; and if ever you are, do it with all your might; for a blessing will rest upon you if you succeed in adding ever so little to the common effort of men of good will.

I shall not speak at any great length of the diurnal birds of prey, almost all of them true bandits, living to our detriment, by murder and brigandage. They hunt by day, never by night, and are therefore known as the *diurnal raptores*. The most blazing light

does not dazzle them. It is even said of the Eagle and others that they can look the sun in the face, and this prerogative is reckoned yet another title of nobility. But there is no great merit in this, considering the manner in which they safeguard their sight. They have three eyelids: first there are two lids like our own, an upper and a lower, which are closed during sleep; then there is a third, half-transparent lid, which is completely withdrawn into one corner of the eye when the bird has no need of it, or drawn across under the other two open lids, when it serves as a curtain. If the light is too dazzling, if the bird has to look into the sun, it draws this ocular curtain, covering the eye with its third eyelid, which, being semi-transparent, allows light-rays to penetrate it, but tempered. This is the secret of the Eagle's bold gaze.

ÉMILE.—I wish I too could protect my eyes with a curtain!

PAUL.—All these birds have a powerful beak, with curved mandibles, well adapted to tearing their prey to shreds. Their feet have four toes, three always pointing forwards and one backwards. The claws are long and sharply curved, and provided, on the inner side, with a sharp-edged ridge, the better to sink into their victim's flesh. The bearing of these birds is haughty, their gaze hard and fierce, and they are wonderfully strong on the wing. They love to wheel and to hover almost without movement of the wings, in the lofty regions of the air to which our gaze cannot

follow them. Yet they, from that immense height, are able to distinguish every movement on the ground beneath them. They explore every farm with their gaze, inspect every poultry-run. If any prey appears, on the instant the bird of rapine falls with whistling wings, swifter than a falling stone. The chicken is snatched away beneath the very eyes of the stupefied farmer.

Let me now name the foremost of these bandits. It is the *Eagle*, which happily is always very rare. It is a great brown bird, three feet or more in length from the point of the beak to the tip of the tail. Its outspread wings cover a span of nearly ten feet. Its fierce eye, shaded by a very prominent eyebrow, gleams with a smouldering fire. The Eagle's nest is called its *eyrie*. It is flat, not hollowed, like that of other birds. It is a sort of solid floor formed by the interlacing of small twigs and covered with a layer of rushes and heather. It is commonly situated on an inaccessible ledge, in the space between two rocks, the upper of which overhangs and forms a shelter. The eggs, two in number, or more rarely three, are a dull white, with rusty speckles. The young *eaglets* are so voracious that while they are being reared the eyrie becomes a veritable charnel-house, always littered with shreds of bleeding flesh. A ledge of rock somewhere near at hand serves the parents as a slaughter-house or knacker's yard, where they break up their prey. There they tear into pieces, for their young,

hares and rabbits, partridges, ducks, lambs and kids, captured in the plain and borne on the wing to the lofty heights which the Eagle loves.

ÉMILE.—Is the Eagle strong enough to carry off a lamb? I have heard so, but could not believe it.

PAUL.—It is perfectly true. He would carry you off if he surprised you alone on his mountains.



FEET OF DIURNAL BIRDS OF PREY.

a, Eagle; *b*, Buzzard; *c*, Kestrel.

ÉMILE.—With a stick I should manage to defend myself.

PAUL.—Perhaps. Among a host of examples I will take one, at random, from an author whom we can believe.

Two little girls, one five years of age, the other three, were playing together, when an Eagle of medium size swooped down on the former, and, despite the shrieks of her companion, despite the arrival of some peasants, carried her up into the air. Two months later a

shepherd found on a rock, at a distance of half a league, the shrivelled body of the child, half devoured. What do you think of the so-called royal Eagle ?

JULES.—He's a brigand of the deepest dye !

PAUL.—Would you like to watch the Eagle hunting, and witness his savage joy when he buries his curving claws in the flesh of the captured prey ? Listen to this magnificent description, from the pen of a passionate lover of birds—Audubon. The scene is far away from here, in America : the Eagle is another species ; but no matter, the habits of these bandits are everywhere the same :—

“ In the autumn, when the birds in their thousands are fleeing the North and drawing nearer to the sun, let your canoe thread the waters of the Mississippi. When you see two trees whose summits overtop all the rest, facing each other on the banks of the river, raise your eyes : the Eagle is there, perched on the bough of one of those trees. His eye sparkles in its orbit, seeming to burn with proper fire ; he is contemplating, attentively, the whole stretch of water. Often his gaze is directed upon the ground. He is watching, waiting. He hears every sound that can be heard ; he listens, absorbing them, distinguishing them.

“ On the opposite tree the female Eagle is standing sentinel ; from time to time her cry seems to exhort the male to patience. He replies by a beating of the wings, an inclination of the whole body, and a squawk whose discordant violence is like the laughter of a

maniac ; then he stands erect again. From his immobility and silence you might think him bronze or marble.

“ The ducks of all species, the water-hens and bustards, are fleeing south in serried battalions borne onward by the stream ; prey which the Eagle disdains, and whose life is saved by this contempt. At last a sound reaches the ears of the two brigands, winging over the water on the pinions of the wind ; a sound that has the harsh sonority of a trumpet. It is the cry of the swan. The female Eagle warns the male by a double call-note. The Eagle’s whole body quivers ; two or three strokes of his beak, which he draws swiftly over his plumage, leave him ready for his victim. He is about to start.

“ The swan appears, like a ship floating in the air ; its neck, white as snow, outstretched before it ; its eye sparkling with anxiety. The rapid movement of its two wings hardly suffices to support the weight of its body, and its feet, folded away under its tail, are invisible. Slowly it approaches, the destined victim. A war-cry is heard, and the eagle is off, with the speed of a shooting-star, of a flash of lightning. The swan sees its slayer, lowers its neck, describes a half-circle, and manœuvres, in the agony of its fear, to escape the impending death. One chance alone remains to it—to plunge into the stream ; but the Eagle foresees the move ; he forces his prey to remain in the air, by keeping continually beneath it and threatening to strike

it in the belly or beneath the wings. This profound ingenuity, which man might well envy the bird, never fails to attain its end. The swan, ever weaker, grows weary and loses all hope of salvation ; but even so its enemy still fears lest it may fall into the river. A stroke of the Eagle's talons catches the victim under the wing and hurls it obliquely upon the bank.

“ You cannot behold the Eagle's triumph without a feeling of fear ; he dances on the corpse, sinks his steely talons deep into the heart of the dying swan, beats his wings and shrieks with joy. The last convulsions of the bird intoxicate him. He raises his bald head toward the skies and his eyes, inflamed with pride, are red as blood. His mate comes to join him. The two together turn the swan over, pierce its breast with their beaks and gorge themselves on the still warm blood that gushes forth.”

ÉMILE.—Poor swan !

XVIII

THE GOSHAWK—THE SPARROWHAWK—THE FALCONS

LOUIS.—What can we do against enemies like the Eagle ?

PAUL.—Destroy them ourselves by all the means in our power, for we cannot count on other help. They are the tyrants of the air ; no bird dares to attack them. The destruction of the nests is the surest means of putting an end to the ravages which they sometimes commit among the flocks. But to reach the Eagle's eyrie and wring the necks of the eaglets is a dangerous undertaking. The shepherds of the Pyrenees go about it in couples, one man armed with a double-barrelled rifle and the other with a long pike. At daybreak, when the Eagle is already at his hunting, the two nest-robbers reach the top of the escarpment where the eyrie is established. The first, with loaded rifle, posts himself on the summit of the rock to fire on the Eagle on his return ; the second, the pike at his belt, descends from rock to rock as far as the eyrie and carries off the eaglets, too young still to offer any serious defence. At the first cry of distress

the mother rushes furiously at the man, flinging herself upon him ; he receives her with thrusts of the pike, while his comrade puts a bullet into the bird. The male Eagle, hovering above the clouds, descends with the rapidity of lightning. He is at the head of the nest-robber before the latter has time to raise his pike again. Luckily a second bullet, fired from the top of the rocks, breaks one of the bird's wings . . .

JULES.—If he missed the Eagle ? . . .

PAUL.—The nest-robber would be lost. His face ripped open by blows of the Eagle's beak, his eyes torn out, he would fall shattered at the foot of the cliff. No, it is by no means a safe undertaking to exterminate a brood of eaglets.

JULES.—No ; they wouldn't get me to do it !

PAUL.—After the Eagle the *Goshawk* is one of the largest of our diurnal Raptores. It is a magnificent bird, as big as a barndoor cock, brown on the back, white on the breast and belly, with numerous darker transversal bands. The eye is adorned with a white eyebrow ; the beak is a bluish-black ; the feet are yellow.

The Goshawk is the pest of our dovecots and pigeon-houses ; so that in France it is known also as the *Dove-Falcon*, or *Pigeon-Falcon*. It selects a point of observation on the summit of a bushy tree, whence it watches the pigeons strutting and courting in the poultry-runs. Woe to the bird that is off its guard for a moment ! The rapacious bird swoops down



DIURNAL BIRDS OF PREY.

a, Golden Eagle. *b*, Goshawk. *c*, Sparrowhawk. *d*, Falcon.
e, Hobby Hawk. *f*, Kestrel. *g*, Kite. *h*, Common Buzzard.
i, Honey Buzzard (head). *k*, Head of Harrier.

($\frac{1}{10}$ natural size.)

To face p. 156.

upon it obliquely, almost grazing the ground ; and in less than no time the pigeon is seized and borne away to some distant solitary rock, where the ravisher plucks and tears it to pieces while still warm. If the farmer is lacking in vigilance the Goshawk will extend its ravages to the farmyard itself. On the mere appearance of the Goshawk's shadow the cock utters a cry of alarm, the chickens hastily take refuge under their mother's wing ; and she, with bristling feathers and kindling eye, sometimes imposes on the ravisher by the fierceness of her aspect. If chickens and pigeons fail the Goshawk, it watches for young hares and squirrels, and for small birds ; in time of dearth it will even pounce on moles and mice. Wooded mountains are its favourite dwelling-place ; there it makes its nest in the tallest oak or ash trees. Its eggs, four or five in number, are a light rusty brown, or bluish, and speckled with brown.

The *Common Sparrowhawk* is about the size of a magpie. Its plumage recalls that of the Goshawk. It is a blue-grey on the back and white on the belly, with transversal stripes of brown. The breast and throat are tawny, and there are six or seven dark bands across the tail. The legs, bright yellow, are long and slender.

The Sparrowhawk likewise is an ardent hunter of pigeons, which it tries to surprise by sailing round the pigeon-house ; or it watches them from the top of a leafy tree. The lark, the thrush and the quail

frequently fall into its clutches. Its flight is low and slanting like that of the Goshawk ; the wings of both birds are short and rounded at the tips, and do not permit of lofty soaring and impetuous flight. Young birds that have recently left the nest and are as yet without experience of the hunter's tactics are for some time trained by their parents for their life of brigandage ; it is not unusual to find the whole family hunting in company. The Sparrowhawk nests in tall trees. Its clutch consists of four or five white eggs, ornamented by spots of brown, which are larger and more numerous toward the large end of the egg. The Sparrowhawk shares with the Goshawk a method of defence already observed in the Long-eared Owl ; assailed by a more powerful enemy, it lies on its back and makes play with its talons.

The *Falcons*, of all our diurnal birds of prey, are the most courageous and the best endowed for flight. They have a distinctive feature in a sharp tooth on either side of the beak at the point ; the beak itself being very powerful and sharply curved from its very root. The wings, pointed at the tip, project beyond the tip of the tail when folded, or at all events reach so far. All the Falcons hover when hunting. In this genus are the *Common Falcon*, the *Hobby-Hawk* and the *Merlin*.

The *Common Falcon*, as large as a hen, may be recognized by a sort of moustache or black streak displayed on either cheek. The back is a very dark

ashen grey, with little transversal bands which are even darker ; the breast and throat are pure white, with longitudinal black streaks ; the belly and thighs are a light slaty grey barred with black ; the tail is barred alternately with black and dingy white. The beak is bluish, black at the point ; the eyes and feet are a fine yellow. For the rest, the plumage of the Common Falcon varies greatly with its age, and it is only after the lapse of three or four years that it fits the description I have given you.

The most ragged peaks, the most precipitous rocks are the home of the Falcon. Thence it keeps a look-out for pigeons, quails, partridges, fowls and ducks. It rises and hovers for a time, to select its victim ; then drops upon it sheer as though it fell from the clouds.

The Falcon has no equal for boldness. It makes its way into pigeon-lofts, chases the pigeon under the eyes of the passers-by, even in the crowded streets, and will seize the partridge that the dog has marked down, even as the sportsman is taking aim. Its voice is powerful and strident. It can fly at a speed of fifty miles an hour, even for hundreds of miles at a time ; but on the ground it has an awkward, bobbing gait, as its crooked toes, armed with ferociously long, curved talons, are ill-adapted for use on the ground. The Falcon builds amid precipitous rocks facing the sun. Its nest, carelessly put together, contains three or four eggs, of a light tawny tint, spotted with brown.

The *Hobby-Hawk* is smaller than the Falcon ; the back is brown, the breast a dull white, the thighs and the lower part of the belly a tawny brown. Its temerity is equalled only by that of the Falcon. It will pursue larks and quails under the very gun of the sportsman,¹ and will dash into the nets of the fowler to seize the decoys. It perches and builds in tall trees. Its eggs are a dull white, very lightly sprinkled with a reddish-brown.

The *Merlin* is the smallest of the diurnal birds of prey ; in size it rarely exceeds the thrush. The back is brown, the belly a dull white, spotted with brown. The nest—but it rarely nests in our parts—is placed in a hollow of the rocks. It contains five or six eggs of a dull white, marbled at the larger end with brown and a dull green.

The Merlin, also, despite its small size, is an audacious bandit. The little birds are like to swoon with terror at the mere sound of the Merlin's wings as it swoops round a bush. The partridge even is not secure from its attacks. It begins by isolating one of the covey ; then, wheeling round it in a descending and contracting spiral, it seizes the victim in its talons and overturns it with a violent blow of its breast.

Such are the principal diurnal birds of prey on which we should wage unmitigated war. Down with these creatures of rapine, these ferocious drinkers of blood,

¹ On the Continent larks and other small birds are accounted game.—TR.

GOSHAWK—SPARROWHAWK—FALCONS 161

destroyers of game, ravagers of the poultry-yard and the dove-cot. Take up your gun, vigilant farmer ; keep a watch for the Falcon and the Goshawk, and fire on the brigands at sight ! Destroy their nests, break their eggs, and wring the necks of their fledglings, if you wish to save your chickens, ducks and pigeons !

XIX

THE KESTREL—THE KITE—THE BUZZARDS

PAUL.—The *Kestrel*, or *Windhover*, belongs to the Falcon family, as is shown by the fine tooth on either side of the point of the beak. It is rather a handsome bird, about as large as a pigeon, in colour a warm brown spotted with black, the tips of the tail white. The beak is a slaty blue, the legs yellow. The Kestrel is the most widespread of the birds of prey, and that most commonly met with near inhabited houses. It is fond of old castles and manor-houses, lofty towers and steeples. We see it indefatigably flying round these buildings with a piercing cry—*pli, pli, pli, pri, pri*—which it utters in order to scare the sparrows ensconced in the holes of the walls and to seize them on the wing. It carefully plucks its little victims before eating them ; but it also hunts another sort of prey, which gives it less trouble : the mouse, which it pursues even in open barns ; and the field-mouse, plump and toothsome, which it espies from aloft, hovering motionless at the same point, the wings and tail gracefully outspread. What will it do with its quarry ? Will it flay the mouse neatly, as it plucks the sparrow ?

No ; the common mouse and the field-mouse are dainty morsels by which the kestrel likes to profit to the last drop of blood. The rodent is swallowed as it is, whole if small enough, by quarters if too large. Digestion completed, the skin and bones are vomited, rolled into pellets, after the fashion of the Owls.

The Kestrel builds in ancient towers, in ruined buildings, and hollows of the rocks. Its nest, made of twigs and roots, contains four or five rusty brown eggs, marbled with brown streaks.

The *Kite* is distinguished from all the other birds of prey by its wide forked tail, its extremely long wings, its rather slender legs and toes, and a beak too small for its size, which is larger than that of the Falcon. This lack of suitable weapons makes it an extremely cowardly bird, alarmed by the slightest danger, so that a mere crow will put it to flight.

Pressed by hunger, it will nevertheless venture into the neighbourhood of poultry-runs or pigeon-lofts, in order to pounce on the chickens and squabs. Fortunately the hen, if she has time to gather her brood under her wings, can intimidate the Kite merely by her anger. In default of feathered game the marauder, the pet execration of the farmer's wife, will attack reptiles, rats, field-mice and voles. At a pinch it will even alight on carrion : on a dead sheep or a stinking fish.

Expanded, the Kite's wings cover a span of five feet. Nothing could be more admirable than the

flight of this bird. When it describes its wide circuits in the limitless air you might fancy that it was swimming or gently floating ; then, suddenly, it checks its flight and remains suspended at the same point for a quarter of an hour at a time, sustained by an invisible quivering of the wings.

The colour of the Kite is a dark, tawny brown on the back, rust colour on the breast and belly, and dull white on the head, while the larger wing feathers are black. Its cry is like the mewing of the cat. It builds its nest in tall trees, or more frequently in hollows of the rocks. Its eggs, commonly three in number, vary from white to a dingy yellow, sprinkled with a few irregular brown spots.

The *Harriers* have as their characteristic feature a semi-circular ruff of fine, densely packed feathers, which extends on either side of the face, from the beak to the ear, and is not unlike the frame of the Owl's eyes. In its divided breast, long legs, long wings, and even longer tail, the Harrier has something of the look of the Falcons ; but in its large head and facial ruff it resembles the nocturnal birds of prey. The Harriers frequent marshes and the shores of stagnant waters, where they lie in ambush among the reeds to seize the small rodents, reptiles and insects that pass within reach. The farmer has nothing to reproach them for ; squabs, chickens, ducklings are respected ; on the other hand, he praises them for their pronounced liking for field-mice. Unhappily,

the sportsman accuses them of levying a heavy toll on furred and feathered game, especially on water-hens, and they even allow themselves to be tempted by young hares and rabbits. I must tell you that the Weasel, a small carnivore with the most bloodthirsty appetites, makes its way into the burrow to seize the leveret and the young rabbit, which it bleeds at the throat, drinking its blood. The corpse is then abandoned behind some bush. The Harrier knows all about these assassinations ; it inspects, by a quiet flight, the surroundings of the rabbit-warrens in the woods, to carry off the dead rabbits and make a meal off the weasel's leavings. That it sometimes makes a mistake and takes for dead a live rabbit I will not deny. After all, I can find it in my heart to forgive the Harrier, and in consideration of its war on the field-mice I am inclined to award it the title of auxiliary.

If some hesitation is permissible in respect of the Harriers, it is not so as regards the Buzzards. These are most assuredly auxiliaries of great merit, mighty devourers of field-mice and voles, great destroyers of moles, which it is important to keep within strict limits.

The Buzzard has a short, broad beak, curved from base to tip ; the wings are very long, but obtuse, almost reaching to the end of the tail ; the legs are powerful, and the space between the nostril and the eye is covered with bristling hairs.

The Buzzards are lovers of repose ; they are lazy birds ; or rather, they are endowed with the faculty of patient immobility, a condition of successful hunting when lying in wait for the field-mouse at the mouth of its burrow. The Buzzard will keep on the watch for hours if need be, without the least movement, without the slightest sign of impatience ; you would think it had fallen asleep. Then suddenly the bird digs into the ground with its beak and tears up the turf with its powerful talons. A disembowelled mole is brought to light, or a field-mouse is captured and promptly swallowed. Now, do you know what sort of a reputation the Buzzard has earned by this protracted immobility, which is indispensable if it is to outwit the sensitive hearing of the mole and the rodent ? The reputation of a stupid bird ; a reputation consecrated by a proverb. In France we say of a person of limited intelligence : " As stupid as a Buzzard." Here again we have that perversity of mind which leads us to execrate the species that help us and glorify those that live at our expense. We see stupidity in the qualities of the Buzzard, which respects our poultry-runs and rids us of innumerable rodents ; but we give the names of courage, nobility, magnanimity to the bloodthirsty rage of the Eagle, the ravisher of lambs, and the Falcon, that robber of the fowl-run.

The *Common Buzzard* is a large brown bird with a whitish throat. The feathers of the belly are marked

with short undulating lines, alternately brown and white ; the tail is crossed by nine or ten dark bars. The beak is whitish at the base, black at the point. The eyes and feet are yellow. This Buzzard builds its nest in lofty trees. The nest is composed of interlacing twigs, and is lined with wool and hair. The clutch consists of at most three eggs, a dull white sprinkled with irregular spots of a dirty yellow. It is the Common Buzzard more especially that has acquired the reputation of being a stupid bird, by its idle flight and its patience when lying in ambush. Its habitual post of observation is an elevated clod of earth. Those who have studied its habits say that the number of mice which it consumes in a day averages sixteen, which makes nearly six thousand in the year.

LOUIS.—Such a bird would be of great value about our dwelling-houses, if it could be tamed.

PAUL.—There is nothing to prevent one from making the attempt ; the Buzzard is a bird of fairly accommodating disposition. Other observers who have watched it hunting field-mice estimate that it eats about four thousand yearly. You may judge from this what legions of small rodents a number of Buzzards will destroy in a given district. But, while we are praising them let us admit their faults. I know very well that if a good opportunity offers the Buzzard does not scruple to finish off a wounded leveret ; I know, too, that in snowy weather, if pressed by hunger, it will carry off a chicken that has strayed away from the

fowl-run. But what are these rare thefts compared with the thousands of rodents of every species of which it purges our fields ! No matter at what time of the year we open the Buzzard's crop, we are certain to find in it common mice, field-mice and voles by the dozen. If I had a field ravaged by these rodents I would hasten to establish there a few sections of tree-trunks, to serve as perches and observation-posts for the Buzzards in their patient hunting.

The *Honey Buzzard* is likewise a very useful bird, which feeds on grubs, caterpillars, and insects, and especially on wasps.

ÉMILE.—The wasps that hurt so when they sting ?

PAUL.—Yes, the Honey Buzzard is fond of the wasps whose sting is so painful ; it swallows them without troubling about their stings, just as the hedgehog eats the viper heedless of its poison-fangs. It attacks their nests with its beak, to pick the nymphs from the cells, and carry them, plump and tender, to its young.

The Honey Buzzard is rather smaller than the Common Buzzard. Its back is brown ; the throat is a yellowish-white with brown streaks ; the breast and belly are white, speckled with dark heart-shaped spots. The tail is crossed by three wide, dark bars. The beak is black. Lastly, the head of the old male is a slate grey. The Honey Buzzard builds in the woods, in tall trees. Its eggs are rather small, in colour yellowish-white, marked with large brown spots, sometimes so numerous that the background is hardly visible.

The *Rough-legged Buzzard* has its legs covered with long feathers. It frequents the banks of rivers, waste land and woods, living on field-mice, moles, reptiles, and, at need, on insects.

There we will leave the birds of prey. I have told you of the principal *Raptores*, both diurnal and nocturnal; I have told you of their habits, their food, the services they render us or the damage they do. It is now for you to complete these too restricted data by observation of the incidents that are continually happening before your eyes. Do not disdain to give an attentive glance at the Buzzard which, perched on a clod or tussock, is patiently lying in wait for the field-mouse; the Kestrel, that flies mewing round the church-tower and swoops now on a mouse, now on a sparrow; the Merlin, that hovers motionless in the blue; you will find, in such data of their habits as you yourself may collect, a mental satisfaction, since the mind is always thirsting for knowledge and, in addition, information of great utility and interest to the farmer.

JULES.—It seems to me, uncle, that you have forgotten the commonest birds of prey, the Ravens and Crows.

PAUL.—The Ravens and Crows are not birds of prey; they have not the hooked beak, the grasping claws, the curved steely talons of the birds fashioned for a life of rapine. I will tell you about them to-morrow.

XX

THE RAVEN

PAUL.—Owing to their black plumage and their similarity of form we commonly call a number of species by the name of *Crow*, thus causing a certain confusion. But before I speak of the Crows I must tell you something about the *Raven*, a great black bird, as big as a barn-door cock, that slowly says *craw, craw, craw* in a big, hoarse voice. This is the bird that has such a reputation in the nursery owing to the famous fable of “The Fox and the Raven.”

ÉMILE.—Yes, I know; you mean the Raven who perched on a tree with a cheese in his beak. Where did he get that cheese?

PAUL.—The story tells us nothing as to that important point. I think he stole it from some window-sill where the farmer’s wife had put it to dry in a rush-basket.

ÉMILE.—The Fox said “Good-day” to Sir Raven. He praised his plumage. “How fine and handsome you are, Sir Raven!” And so on. He must have felt proud to hear himself complimented so!

PAUL.—That Fox was a cunning rascal. To make



THE RAVEN AND THE CROWS.

a, Raven. *b*, Carrion Crow. *c*, Hooded Crow. *d*, Rook.
e, Jackdaw.

($\frac{1}{3}$ natural size.)

the Raven fall into the trap he set by his flattery he did not begin by exaggerated praise, which might have aroused the bird's suspicions, for he is not without some common sense ; he began by praising what is really worthy of some praise. If you look closely you will see that the Raven is not a uniform black ; he has a purple and bluish lustre on his back, and under his belly a shimmering greenish tint. His plumage gleams and glistens like polished metal. At the first flattering remarks of the Fox you may be sure the Raven would give a complacent glance at his costume, and seeing it gleaming with blue, purple and green, would find it as splendid as the Fox said it was. Now the way is prepared ; the bird is in the mood for grosser flattery. The Fox will persuade him that his carrion odour is a musky perfume and his croaking a melodious warble. That was the difficulty, to make him caw, to make him open the beak that held the cheese.

ÉMILE.—“ Really and truly,” says the Fox, “ if the warbling of your voice is as beautiful as your feathers you are the paragon, the phoenix of birds ! ”

PAUL.—Do you see how the cunning fellow goes to work ? He calls the hideous *caw, caw* a warbling, a song like that of the skylark or the nightingale. If he had begun like that he would have failed ; the compliment would have seemed too fulsome. But he has skilfully prepared the way ; what is more, the better to pique the Raven's foolish vanity, he expresses his admiration in a rather doubtful tone. “ I know,”

he says, "that you are famed as a singer; they praise your voice through all the countryside; but can your voice really be equal to your plumage? Is the song truly worthy of so magnificent a costume? I should have to hear you sing; and if it really is so, then, truthfully, you are a perfect bird, the one and only bird to deserve the name of phoenix!" "Oh, you are doubtful!" says the Raven to himself. "Well, listen to this song: *Craw, craw, craw!*"

ÉMILE.—And to show what a beautiful voice he had he opened his beak wide and let the cheese fall and the Fox seized it!

PAUL.—Not yet; if he had had the cheese in his mouth he could not have spoken and told the Raven the moral at the end of the tale. I can see him putting his paw on the cheese and licking his chops and looking maliciously at the confused Raven. "My poor fellow," he says, "let me inform you that you are a silly coxcomb!"

ÉMILE.—He doesn't call him Sir Raven now he has got the cheese!

PAUL.—It was all very well to call him Sir Raven at the outset, to flatter him; but now the Fox is laughing at him and calls him "my poor fellow," as though he were kindly condoling with him. To sympathize with the person one has duped is the perfection of rascality. That Fox would certainly make his way in the world. Read the tales of La Fontaine, the incomparable story-teller, and you will learn the wicked

tricks he plays the Goat, the Wolf, and many others ; or wait until the winter comes, and we'll read them together by the fire. For the moment we will leave the Raven of the fable and learn how the real Raven lives.

This bird does not assemble in flocks like the Crows ; he lives alone or in pairs on the ledge of a cliff or a tall tree. The company and even the neighbourhood of his kind is intolerable to the Raven. If any other Raven attempts to settle in his district he drives him away, even though the other were born in his own nest. If the intruder is merely passing through the area the Raven escorts him, with menaces, to the frontier of his domain and keeps him under observation until he is lost to sight in the distance. The Crows, those lovers of society, are treated with the same severity. The Raven likes to be alone, quite alone, on his weathered rock, and woe to the ill-advised intruder who should disturb his solitude ! He sometimes makes his nest in the upper boughs of some isolated tree, but prefers some crevice in a sheer precipice. The outside of the nest is made of roots and twigs ; the inside of moss, down, rags or fine grasses.

JULES.—I would like to know what the Raven's eggs are like.

PAUL.—Birds' eggs are in general remarkable for their fineness of form and colour, and are worth consideration for this reason alone. Further, it is well

to be able to distinguish them one from another, to be able to tell whether they belong to a useful species which we ought to respect, or a mischievous species which should not be allowed to multiply near cultivated areas. For this reason I have already given you descriptions of the eggs of our principal birds of prey, some of which should be destroyed without faltering and others protected. Since it interests you I will do the same in the case of the birds I have still to tell you about. So you shall know that the Raven's eggs are much more prettily coloured than you would suppose from the funereal plumage of the bird. They are bluish-green, with brown spots. This blue-green background, sometimes brighter, sometimes duller, is found, together with the brown spots, in the eggs of the Crows, the Magpies, the Jays, the Blackbirds, the Thrushes and the Fieldfares, birds which display close similarities of organization despite the great variety of their habits, size and plumage. Some Blackbirds and Fieldfares have eggs of a magnificent sky-blue.

The Raven lives on all sorts of things. Fruits, grubs, insects, germinating grain, fresh meat, putrid flesh, suit him equally well. He is especially greedy for carrion, which he contrives to discover at a great distance, guided by the senses of sight and smell. Wherever the carcass of an animal may be lying he soon puts in an appearance, disputing the horrid banquet with the dogs. The habit of gorging himself

on this filthy food gives him a disgusting odour. When there is a lack of dead prey, which best suits his tastes, his voracious appetite and his cowardice, he hunts living game, such as the leveret, the rabbit, and the small noxious rodents ; he pillages nests, taking eggs and nestlings, a succulent feast for his young ; he is even bold enough to carry off chickens from the fowl-run. I make not the least claim in his favour. I leave him to the hatred which his lugubrious plumage, his fierce glance, his sinister croaking, his carrion odour, his disgusting voracity and his ferocious character have from all times earned him.

XXI

THE CROWS

PAUL.—We have in France four species of Crow : the Carrion Crow, the Hooded Crow, the Rook and the Jackdaw.¹

The *Carrion Crow* has the same plumage and the same general appearance as the Raven, but is only three-fourths as large. In the warm seasons it lives in couples in the woods, whence it emerges only to seek food. In the spring its food consists of birds' eggs, especially of partridges', which it adroitly impales, bearing them off to its young on the point of its beak. Like the Raven, it has an excessive fondness for putrid flesh and for small birds that are still unfledged ; it attacks small game when enfeebled or wounded, and will venture into the poultry-run to steal an inexperi-

¹ To these, in England, we may add the Chough, still found, though in decreasing numbers, in the cliffs of Devon and Cornwall, and here and there in Wales, Ireland, the Isle of Man and the Hebrides. It is a graceful bird, of glossy black plumage, with a slender, curved bill, which is, like the legs, a fine bright scarlet. Its diet is of insects, shellfish, slugs, snails, etc., and the small amount of corn which it consumes when opportunity offers should be reckoned as only a moderate wage for its services.—TR.

enced duckling or a chicken that has strayed from its mother. Carrion, grubs, insects, fruit, grain, according to time and place, all go to swell its crop. It loves walnuts and knows how to crack them by letting them fall from a height.

In winter the Crows assemble in numerous companies, by themselves, or mingled with rooks and jackdaws. They roam step by step through the fields, in and out among the sheep, often jumping on their backs to seek for vermin under the wool ; they follow the plough, to feed on the grubs turned up by the share ; they probe the cornfields after sowing and eat the grain which germination has rendered soft and sugary. In the evening they fly off to the tall trees of some neighbouring wood, where they chatter as the sun sets, and preen their feathers, and finally go to sleep. These trees are their rallying-places, where they assemble every evening, coming from all points of the compass, often from a distance of many miles. At daybreak they divide into companies, more or less numerous, and make off in all directions to seek their food on the cultivated land.

At the end of the winter the general society is dissolved ; the Crows pair, and each pair selects, in some neighbouring woodland, a district about half or two-thirds of a mile in diameter, from which all other couples are excluded, so that each family can be sure of finding subsistence. The nest is situated in some tree of average height. It is made of small branches

and roots interlaced, roughly plastered with mud or horse-dung, with a lining of fine roots. If some bird of prey should pass near the nest the parent Crows assail it with fury and split its skull with a blow of the beak.

ÉMILE.—Well done, plucky Crows ! The bird of prey will realize it doesn't pay to disturb you and your family !

PAUL.—I admire the courage of the Crows protecting their brood, but I cannot forgive them their depredations in the poultry-runs, and their excavations in sown fields. You must inscribe the Crow among the bandits to be destroyed.

You must do the same with the *Hooded Crow*, so called because of the sort of light grey hood, or rather scapular, which covers his belly and shoulders and back down to his tail. The rest of his plumage is black with blue reflections, like that of the Raven. This crow comes to our part of the country towards the end of the autumn, and assembles in companies with the Carrion Crows and the Rooks, spreading over the fields in search of germinating grain and grubs. On the sea-coast, where it is much more frequent than inland, it lives on fish and molluscs cast up by the tide or thrown aside by the fishermen. Dearth alone can compel it to feed on carrion, the delight of the Raven and the Carrion Crow. In March the Hooded Crow leaves us to nest in the northern countries.

The *Rook*, a little smaller than the Carrion Crow, has

the same plumage, with more violet and bronze in the reflections. Its beak is straighter and more pointed. It may easily be distinguished from its black kindred the Crows and Ravens by a sign characteristic of its habits. The skin round the beak is quite bare of feathers, white, dusty, and as though cicatrized. Is the bird born thus? Not a bit of it; just as the labourer who handles rough and heavy articles gets great corns on his hands, so the Rook gets a scaly cicatrix on his face. He is a most industrious worker with the pick, and his pick is his beak, which he buries in the ground as deep as he can. By continual friction against the soil the fore part of the head and the parts round the beak lose their feathers, become bald, and are soon flayed until they become covered with rugged scars. The object of the Rook's painful efforts is to reach the white worms and all the other noxious larvæ that are the plague of tilled land. One day I saw some Rooks very busy, in an untilled field, in raising and turning over the stones scattered here and there. So eager were they that the lighter stones were thrown five or six feet from the ground. Now, guess what they were seeking so busily. They were looking for insects and all sorts of vermin. Constantly occupied in such tasks as turning stones and driving their beaks into the ground, the Rooks are bound to somewhat damage their tool, the beak, and to denude the base of feathers.

I should hold these birds in great esteem if they

would confine themselves to hunting for worms and insects ; unhappily, they have a pronounced taste for germinating seeds, a sugary delicacy which inspires them with ingenious means of procuring it. It is said that they are in the habit of burying acorns and digging them up long afterwards, when germination has made them lose their astringent flavour.

ÉMILE.—It is clever of them to think of that. The bitter, hard acorn is put in the earth to moisten. When he thinks it ready the Rook, who has a good memory, comes back and digs up the acorn, now soft and nicely flavoured, and feasts on it.

PAUL.—So far we have no complaint to make of him ; a bushel or two of acorns more or less is no great matter ; I would willingly leave them for the Rooks to prepare in this curious manner. But all germinating seeds are equally to their taste, especially corn, so easy to obtain in winter from newly sown fields. When I see a flock of Rooks solemnly wandering step by step along the furrows, here and there burying their beaks in the ground, softened by being frozen and then thawed, I know very well that those birds might pretend that they were hunting for cockchafer-grubs, but only a simpleton would accept the excuse at that time of the year ; the white worms have then gone too deep for the rook's beak to reach them. What it actually does reach is the corn. As the Rooks go about in very large flocks, in flights capable of darkening the sky, such harvesters, you will understand,

will very quickly win their harvest. This is not all : in the autumn the Rooks eat large quantities of walnuts and chestnuts in countries where these are grown ; in the spring they probe the potato-fields in order to dig out the newly planted seed-potatoes.

LOUIS.—Could not these robbers live on carrion as the Crow and the Raven do ?

PAUL.—The Rook never touches a dead animal, however pressed by hunger. He must have fruits and grain, or else larvæ and insects. Accordingly, as he seeks the one sort of diet or the other, the Rook is a friend or an enemy. Consequently, very different opinions are held of the Rook. Some, taking into consideration only the depredations committed in sown lands, would like to wage implacable war upon them, calculating that a Rook destroyed means at least a bushel of corn saved. Others regard principally the destruction of grubs and insects. They say that the Rooks deserve well of the farmer, that they rid the fields of their vermin, that they follow the plough to pick the white worms out of the furrows, and reach with their sharp beaks the cockchafer pupæ undergoing metamorphosis in the ground. For these reasons, which for that matter are very good ones, they declare the Rook worthy of our protection.

LOUIS.—Which of the two opinions ought we to accept ?

PAUL.—In my opinion, neither ; we should take a middle course, as in the case of the Mole. If there are

great numbers of cockchafer grubs, wireworms and leather-jackets, let us tolerate the Rooks ; in the contrary case let us drive them from our fields. We have against the larvæ of the cockchafer two auxiliaries of the greatest value : the Mole and the Rook, whose depredations, unfortunately, we must weigh against their services. Let us respect them if we have to fear a worse evil ; if our fields are in good condition let us rid ourselves of their presence.

The Rook lives in company with his kind all the year round. Rooks go in flocks to seek their food ; they rest, too, in flocks in the same locality. A single oak-tree sometimes bears ten or fifteen nests, and the adjacent trees may bear each as many, over quite a considerable area. There is a great uproar in the aerial city at the season of nest-building, for the Rooks are very noisy, and inclined, moreover, to steal from their neighbours. When a young pair, as yet devoid of prudence, leave their work of building for a moment to go in search of fresh material, the neighbours rob the nest and carry off, one a twig, another a stalk of grass or a bit of moss, to use them in building their own nests. On their return the ill-used Rooks fly into a terrible rage, accusing this and that and the other of their neighbours, and then, coming to an understanding with some of their friends, they fall on the thieves, pecking them soundly, if the theft has not been cleverly concealed. To avoid such pillage experienced pairs never leave the nest untenanted ;

one remains to guard it while the other goes in search of material.

The *Jackdaw* is black, with the back of the head and nape and ear-coverts grey; the iris is bluish, almost white, and the pupil small, so that the eye has rather a fierce expression. The bird is about the size of a pigeon. Like the Rooks, with whom the Jackdaws consort a great deal, they fly in flocks and nest in the company of their kind. High towers, ancient castles, belfries and cliffs are their favourite dwelling-places. Their nests, built of a few twigs and a little straw or hair, are sometimes built singly, in holes in the walls or cliffs, and sometimes close together, packed almost into a single mass. Jackdaws, when flying, continually emit a sharp, strident cry. They feed on insects, worms, larvæ, grain and fruit; never on carrion. They render us some service in clearing trees of caterpillars, but I reproach them with stealing the eggs of smaller birds. Although the Jackdaws always live in church towers, or castles, or cliffs, they move about, for the most part, in numerous flocks, sometimes alone, but sometimes in the company of Rooks or Hooded Crows.

XXII

THE WOODPECKERS

OPPOSITE Uncle Paul's house is a grove of a number of ancient beech-trees, whose boughs interlace at a great height, forming a continuous roof of verdure, supported by hundreds of grey trunks, smooth as columns. There, in autumn, Émile and Jules go to hunt in the moss for fungi of all colours, in order to submit them to Uncle Paul, who shows them how to distinguish the kinds which are good to eat from the harmful species. There they hunt various fine beetles : the Stag-beetle, whose great flat square head bears enormous branching pincers ; the great black Capricorns, which run along the dead branches at sunset, their knotted antennæ, which are much longer than their bodies, curving backwards from their heads ; the Saperdæ, which likewise have long antennæ, but whose wing-covers are richly coloured, sometimes a bluish-grey, sometimes yellow or tawny, with spots and stripes of black velvet. A host of birds of all species have chosen this wood as their home. The quarrelsome jay squabbles with its fellows over a beech-nut ; the magpie grates and rattles on a lofty

branch, then drops down into the neighbouring field, flirting its tail and looking about with a suspicious eye; here the crows hold their evening assembly; here the woodpeckers hammer on dead bark to make the insects emerge, and snaps them up with a sticky tongue. Listen—it is at work: *toc, toc, toc*. If anything disturbs it at its labours it flies off, with the cry: *tio, tio, tio, tio*, quickly repeated thirty or forty times in succession, sounding not unlike a noisy burst of laughter.

“What is that bird, that seems to jeer at us, bursting out laughing when it flies away?” Jules and Emile one day asked one another, watching from their window the doings of the jays and woodpeckers in the boughs of the beech-trees. Jacques, Uncle Paul’s gardener, heard them all as he watered his cabbages. Having carefully adjusted the irrigation channels to distribute the water, he came up under the window for a moment, to chat with the children.

JACQUES.—That’s the Woodpecker, that bird you see, with the green plumage and the red head. It has several kinds of cry. If it is going to rain it says *plieu, plieu*, drawing out the notes in a plaintive sort of way. When it is working, in order to cheer itself up and keep going at it hard, it gives a loud harsh cry now and again, that resounds all through the wood: *tiacacan, tiacacan*. At nesting-time it gives the rapid cry you’ve just heard: *tio, tio, tio*.

JULES.—Then it has its nest in the wood, now?

JACQUES.—It is hard at work making it, for I've heard it hammering away all the morning. You see, it makes the nest at the bottom of a hole which it digs for itself, with its beak, in the trunk of a tree. It's a famous beak, I can tell you, is the Woodpecker's. It is so hard and so sharp, the bird is always afraid of going too deep into the wood. After he's given two or three good blows he runs quick to the other side, to make sure he hasn't made a hole right through the trunk.

JULES.—You're making fun of us !

JACQUES.—Not a bit of it ! That's what they say, and I myself have often seen the Woodpecker hurry round the trunk to have a look at the other side.

JULES.—He must have some other reason for that ; I shall ask my uncle.

JACQUES.—Ask him, too, if he knows the iron-plant that the Woodpecker rubs its bill with, so as to make it harder than steel.

JULES.—I'm quite sure you are making that up, about the iron-plant.

JACQUES.—Well, that's what they say : I don't know anything about it myself. They say it's a very rare herb, and that the Woodpecker goes and searches for it in the wildest mountains, to make its beak hard and sharp. Everything the herb touches becomes as hard as the finest steel. What a find it would be, and how useful for sharpening my scythe and sickle, my billhook and pruning-knife ! I know more than

one man who would give a bag of gold for the Woodpecker's secret !—

The cabbages had drunk their fill ; it was the turn of the lettuces. Jacques went back to his irrigation-trenches while the children racked their brains to decide how much truth there was in the tale of the iron-plant, and the Woodpecker's anxiety lest it might have pierced right through the tree-trunk. That evening they asked their uncle about these things.

PAUL.—There is both truth and falsehood in what my worthy gardener told you. The truth is what he saw himself ; the falsehood, what he repeats as an accepted belief in the country. He has informed you quite correctly of the Woodpecker's different cries, which he knows perfectly, having heard them so often ; he told you the truth about the bird's habit of going quickly to the other side of the tree when it has struck a few blows with its bill. All the rest is a false interpretation of the Woodpecker's movements, or a fable, invented to amuse, the origin of which you will perceive when you know the true history of the bird.

The Woodpeckers feed only on insects and grubs, above all, of species that live in wood. The big larvæ of the Capricorns, the Stag-beetles, the Saperdæ, and other beetles are their favourite diet. To get at them they have to break up decaying bark and bore into rotten and worm-eaten wood. The instrument employed for this laborious task is the bill, which is straight and wedge-shaped, square at the base, grooved

along its length, and shaped at the point like a carpenter's chisel. Its substance is so hard, so solid, that in order to explain the bird's possession of this perfect instrument some simple-minded woodman imagined the fable which others have repeated: the childish tale of the "iron-plant." Need I tell you that this plant does not exist, and that nothing in the world can by its mere touch give objects the hardness of iron or steel?

JULES.—I thought as much when Jacques told us of it; I could hardly believe in his wonderful plant.

PAUL.—The Woodpecker does not need to rub its bill against anything whatever to make it hard enough for the work it has to do; it is born with a strong beak, that never needs re-tempering. This beak grows out of a very thick skull, too strong to be injured by the shock of the blows which the Woodpecker strikes; it is moved by a short, powerful neck, which can repeat the blows without fatigue, even if the bird has to chip away the wood to the very heart of the tree-trunk. When the hole is made the Woodpecker darts into it a disproportionately long tongue, round as a worm, sticky, and armed with a hard, barbed point, with which it pierces the grubs uncovered in their burrows.

In order to climb up the trunk of the tree to be explored and to hold on to it for hours, if need be, at the point where the larvæ seem to be concealed, the Woodpecker is endowed with short, strong-muscled

legs, ending in feet with four thick toes, two pointing forwards and two backwards, which are equipped with strong, sharply curved claws. The position of the bird against the vertical surface of a tree-trunk is facilitated not only by the division of the toes into two equal pairs, front and back, and by the strength of the claws, which cling to the irregularities of the bark, but also by a third point of support, furnished by the tail. The strong tail feathers are stiff and bent slightly inwards, worn at the ends and covered with a coarse fluff. When the bird is striking with its beak at a point which requires a prolonged effort, it settles itself firmly on the tripod formed by its tail and its two feet, and thus maintains itself immovably in the most awkward positions ; it is thus able, at a single stretch, to strip the trunk of a dead tree of its bark.

What it seeks with such perseverance are the insects which live under the bark. It can tell by the hollow sound emitted by the point struck that the wood is rotten and eaten by larvæ ; or, by the duller, sharper sound that the spot is not worth further exploration. In the first case it removes the bark ; it chips away the sound wood, and with heavy blows of its beak opens up the rotten part and captures, in its retired shelter, some fat Capricorn larva ; in the second case it strikes two or three well-directed blows that jar the dry bark and alarm the insects sheltered beneath it. Immediately the insect population makes its way, some in this direction, some in that, toward the opposite

point of the trunk ; but the Woodpecker, fully prepared for this, makes a rapid half-circuit of the tree and captures the fugitives on the other side.

JULES.—Now I understand what Jacques told me. It is not to see whether it has gone right through the trunk with its bill that the Woodpecker runs to the other side of the tree, but to seize the retreating insects. I thought the Woodpecker very silly to imagine it was strong enough to pierce a tree-trunk with a blow of its bill ; but now I know the real reason of its action I think it very cunning.

PAUL.—I repeat once more : animals have more intelligence than people suppose ; so let us take care not to misjudge aptitudes whose reason escapes us. Do not people call the Buzzard stupid, because of its incomparable patience in watching, motionless, for the suspicious field-mouse ? And now the Woodpecker is accused of the silly belief that it pierces a tree-trunk with each blow of its bill, because it hurries to capture the insects fleeing to the opposite side. Remember, the only stupidity in animals is due to our own way of looking at them. When we understand their actual aim we always find their actions perfectly logical, as they should be. The animal cannot choose what actions it shall perform ; it is created to exercise invariable functions in conformity with its manner of life and determined from all time by the wisdom of Providence, which cannot be guilty of inconsequence in respect of creatures deprived of liberty. Only man is free ;

by a sublime privilege he is abandoned to the opposite inspirations of good and evil, of sane reason and blind passions, so that for him there is a meritorious conflict, in view of his immortal destinies ; he rules and chooses, at his risk and peril, to his future greatness or his confusion, the true or the false, the just or the unjust, the beautiful or the ugly. Hence results, in us, a certain blending of moral strength and weakness, of truth and error, of light and darkness, of impulse and withdrawal. The animal, not having to fight, as we have to fight, the good fight of life, is now what it has always been, what it will always be ; it does to-day what it did yesterday, what it will do to-morrow ; for centuries upon centuries it does it without alteration, with neither improvement nor deterioration, with unconscious logic, but infallibly, because it is for all time ruled by the Universal reason.

The Woodpecker's life is passed in circling round tree-trunks from the ground upwards, jarring with its bill the old bark that shelters insects, probing all fissures with its pointed tongue, which stretches worm-like along the galleries of the perforating larvæ. These birds are appointed guardians of the forests ; they inspect more particularly the sickly trees, riddled by vermin, and make salutary incisions into the rotten portions. Sometimes they may attack living wood, especially when building their nests, endangering the security of the tree by deep excavations. But such damage is very largely compensated, and, without

hesitation, I award the Woodpeckers the title of forest rangers, a title well earned by their assiduous war upon the insects destructive to timber. They rarely leave their workshop, the trunk and the main branches, to descend to earth, save where they have discovered an ants' nest, whose inmates they devour with gusto. They build this nest at a great height from the ground, at the end of a round hole excavated by blows of their bills, in the heart of a tree-trunk. The bed of the nest is of moss and wool. The eggs, in number four to six, are, in all the species of Woodpecker, white, smooth and lustrous as ivory.

XXIII

THE GREEN WOODPECKER—THE SPOTTED WOODPECKERS—THE WRYNECK—THE NUTHATCH

PAUL.—The most widespread of our woodpeckers is the *Green Woodpecker*, a bird as large as a wood-pigeon. Its plumage is of a brilliance unusual in European birds. The top of the head and the nape are a magnificent carmine; two moustaches of the same colour adorn the face; the back is green, the breast and belly a yellowish-white, the rump yellow, while the wing feathers are black with white edges. The female is distinguished from the male by her brilliant colours and by moustaches which are black instead of red.

It was the Green Woodpecker's resounding *tio, tio, tio* that you heard in the wood this morning. I shall not say more about its different cries, since Jacques described them for you very well. The Green Woodpecker is passionately fond of ants. When it discovers an ant-heap it settles close beside it and lays its long, sticky tongue across the little path followed by the ants. You know the marching habits of these little creatures. They march in file, following in one another's

tracks, in one or many ranks, without deviating from the path followed by the foremost. The Woodpecker's tongue, covered with a glue furnished by the saliva, is laid across this path. The ants arrive, hesitate a little before the black barricade, and then enter into the treacherous snare, to join the vanguard, which goes on as if nothing were amiss. Now one is snared ; now four ; now ten are struggling, safely limed. The Woodpecker does not move ; he waits until the spit is full. He has not to wait long ; the tongue, loaded with game, returns to the back of the bill. There is one mouthful. Immediately the same manœuvre is repeated, the tongue is laid on the ground and withdrawn black with ants, until the bird is sated.

ÉMILE.—You said just now that the animals have more sense than we think ; the Woodpecker's trick makes me realize that plainly. Instead of picking them up one by one, a very long job with such small game, the woodpecker catches the ants by dozens at a time. It stretches its tongue along the ground where they are going by, draws it back when it is loaded with ants, and the thing is done. In this way, at all events, the bird gets a mouthful that is worth the trouble. Who would ever have thought of laying a trap with one's tongue, a trap in which the game is caught with glue ?

PAUL.—Its passion for ants does not make the Woodpecker forget its office of forest ranger. It climbs the trunks of trees, always upwards, probing



WOODPECKERS AND CLIMBING BIRDS.

a, Green Woodpecker. *b*, Spotted Woodpecker. *c*, Wryneck.
d, Nuthatch.
($\frac{1}{3}$ natural size.)

To face p. 194.

WOODPECKERS—WRYNECK—NUTHATCH 195

the diseased portions and delivering blows with its beak that sound in the distance like blows of a hammer. If some passer-by surprises the bird it does not at first fly away ; it whisks round the trunk, like the squirrel, and once on the other side it protrudes its head a little, to watch the intruder approaching. If he advances the bird continues to circle round the trunk, always keeping on the farther side, until fear gets the better of it ; when it flies away emitting its cheery, sonorous cry : *tiacacan, tiacacan*. It flies by leaps and bounds, plunging and rising, describing in the air a series of undulating curves.

When building its nest it digs a deep hole in some soft-timbered tree, such as a pine or a poplar. The male and female work away, using their bills as mattocks, relaying one another when the work is most difficult, when they have to pierce the living part of the trunk until the decaying and worm-eaten heart is reached. The chips and shavings and splinters of decayed wood are thrown out with the feet ; finally the hole is made so oblique and so deep that the daylight cannot enter. The little birds emerge from the nest long before they can fly. One sees them exercising themselves round the natal trunk, learning to climb, to wind their way in a spiral round the trunk, to cling to the bark back undermost. I recommend you to watch their amusing evolutions if ever you have the luck to see a young family of woodpeckers.

The Great Spotted Woodpecker, or Pied Woodpecker,

is the size of a thrush. It has a wide transversal band of red on the nape. The upper part of the body is prettily marked with pure white and jetty black; the under part is white as far as the lower part of the belly, which, with the rump, is red. The female has no red on the nape. The Spotted Woodpecker's food is the same as that of the Green Woodpecker. Its blows are quicker and sharper; if perturbed it will cling motionless under a stout branch, its gaze fixed on the object that alarms it. Its cry is a sort of hoarse croaking : *tu, u, u, u, u*.

The *Lesser Spotted Woodpecker*, or *Barred Woodpecker*, greatly resembles the Pied Woodpecker in plumage. It is a smaller bird. It has a red cap that covers all the top and back of the head, while the Pied Woodpecker has only a band of thin colour on the nape. The Pied and Barred Woodpeckers both inhabit the large afforested tracts of France; they live on the same diet: insects and wood-boring larvæ and ants. Both birds, by their costume of black velvet pied with white and their scarlet caps, deserve to be counted among the prettiest of our birds.

To them we may add the *Little Pied Woodpecker*, the smallest of our Woodpeckers. Its size is that of a sparrow, its costume that of the Pied Woodpecker. This bird inhabits almost exclusively the pine-forests of the east of France and the Pyrenees.

The *Wryneck* is akin to the Woodpeckers in the conformation of its feet, whose four toes are divided

into two pairs ; by its very long, sticky tongue, which it darts into ant-heaps or lays on the ground to gather up the passing insects. It is a small bird, the size of a skylark. Its plumage is grained with black, brown, grey and rusty red, something like that of the woodcock, but the colours are never definite and the effect more beautiful. The Wryneck is a great eater of caterpillars and is passionately fond of ants, which it captures, as the Woodpeckers do, by laying its sticky tongue across their path. It owes its name to its habit of twisting and turning its neck backwards, and turning its head over towards its back with slow, sinuous movements, like those of an adder.

ÉMILE.—Why does it turn its head back like a snake ?

PAUL.—It is its way of expressing surprise or alarm ; perhaps it seeks, by these tortuous, reptilian movements, to intimidate the aggressor. Sometimes it succeeds in doing so. If some birds'-nester climbs up to its hole to rob it of its young the Wryneck begins to hiss from the bottom of its nest and to undulate its neck. The young birds, still unfledged, do their best to imitate their mother, so that the robber thinks he has put his hand into a brood of vipers, raising and brandishing their heads. Startled, he hastily descends, not without leaving tatters of his breeches in the branches.

ÉMILE.—Serve the rascal right !

PAUL.—The Wryneck arrives in France in April

and leaves about the end of summer. It haunts the edges of woods, visiting gardens and orchards to strip them of caterpillars. It nests in a hole in a tree and gladly makes use of the deserted holes of the Woodpeckers, which it prepares for its own use by slight repairs. The eggs lie on a mere bed of sawdust, if we may call it so, which the bird showers down by blows of its beak from the walls of its hole. They are white and polished, like those of the Woodpecker.

Despite the conformation of its feet, the Wryneck does not climb up the bark of trees and rarely perches on them : it prefers to remain on the ground in order to search for caterpillars or draw its tongue across the path of the ants.

The *Nuthatch*, on the other hand, although unlike the Woodpeckers in the conformation of its feet, is a climber of the first order, and spends its life in winding its way round the trunks of trees, inspecting the fissures in which insects take refuge and tapping old bark with its beak. Three of its toes point forwards ; the fourth only points backwards. But in respect of maintaining a firm hold this toe is worth two, so large and strong is it, and so sharply crooked and powerful the claw at its tip. The beak is like the Woodpecker's ; it is straight, faceted, and sharply pointed. It is an excellent tool for excavating wood or extracting grubs. The tongue cannot be used like the woodpecker's tongue for snaring insects, and the tail does not serve as a point of support.

WOODPECKERS—WRYNECK—NUTHATCH 199

The Nuthatch explores old trees in all directions, sometimes climbing the trunk, sometimes descending, sometimes moving along a spiral, sometimes inspecting a branch, now on the top, now underneath. Every chink is probed with the point of the bill, with a cry : *tuu, tuu, tuu*, repeated every moment, in a loud tone. Very few insects can escape so assiduous a search. If there is any lack of grubs, the Nuthatch makes a frugal meal off a hazel-nut. It begins by wedging it firmly in the fork of a branch, and then hammers it with its bill, encouraging itself with its voice until it has pierced the hard shell and laid the kernel bare.

JULES.—It must take the bird a long time to pierce the shell with its beak.

PAUL.—No ; it is very soon done, the beak is so hard and sharply pointed. Very quickly, too, a Nuthatch placed in a cage will pierce the wooden wall of its prison and make a hole big enough to pass through. Not even the Woodpecker has a better chisel.

The Nuthatch is about the length of a sparrow, but more sturdily built. The upper parts are all a light slate-grey, the throat and cheeks white, the breast and belly russet. A black band, starting from the corner of the beak, passes over the eye and runs along either side of the neck. This bird nests in a hole in a tree, and if the hole is too large it will contrive to make it smaller with a ring of clay. The eggs, five to seven in number, are laid on moss or fine chips of wood. They are a dingy white, speckled with rusty brown.

XXIV

THE TREE-CREEPERS—THE HOOPOE

PAUL.—I have just told you something of the woodpeckers and the nuthatch, insect-eaters whose bill is strongly made, like a chisel, to open up the tree and extract the grubs that live in the substance of the wood. After the woodpeckers I placed the wryneck, that does not perforate old tree-trunks with its beak, but, like the former, knows the trick of laying its tongue across the path of ants, to lime them as they arrive. Now we come to other insect-eaters, charged with the less strenuous labour of picking out, one by one, without any splintering of wood, each tiny creature that takes refuge in the smallest fissure. For this sort of hunting the bill is made longer and slenderer, and is curved.

As their name indicates, the *Tree-Creepers* are skilled in climbing. The bill is flattened at the sides, the better to enter the chinks in the bark of trees ; it is bent into the arc of a circle, and has a fine sharp point. Their feet have three toes in front and one behind, which is stronger than the rest. We have two Tree-Creepers in France : the tail of one contains a few long stiff feathers on which the bird supports



SOME INSECT-EATERS : I.

a, Tree-Creeper. *b*, Wall-Creeper. *c*, Hoopoe. *d*, Common Shrike
or Butcher-Bird. *e*, Pied Shrike. *f*, Cuckoo.

($\frac{1}{4}$ natural size.)

To face p. 200.

THE TREE-CREEPERS—THE HOOPOE 201

itself when climbing, as do the woodpeckers; the tail of the other species does not contain this aid to climbing.

The *Common Tree-Creeper* is quite a small bird, with dull white plumage, spotted with brown on the back and a rusty red on the rump and tail. It lives the most laborious of lives. It frequents woods, orchards, and the trees of public parks, and is always occupied in circling quickly, in all directions, round the trunks of the trees, in order to insinuate its slender bill into the crevices of the bark and capture the tiny flies and plant-lice, and the caterpillars and cocoons of small moths that are ensconced there. It runs down the trees as quickly as it climbs them, which the woodpeckers cannot do, their movements being always upwards, either in a straight line or along a spiral track. It climbs by little leaps and runs, with the aid of its tail, which is pressed against the trunk; having reached the top of the trunk it descends, hurriedly, to recommence its quest on a neighbouring tree. To encourage itself it utters, at every movement, a shrill, piping cry. At night it retires into some tree-trunk. There, too, it makes its nest, composed of fine grasses and bits of moss bound together with threads of cobwebs. There are five to seven eggs; they are pure white and speckled with rusty spots.

The *Wall-Creeper*¹ creeps along vertical rock-faces

¹ There are only five records of this bird having been seen in England.—TR.

and old walls, in whose interstices it finds various kinds of insects, larvæ, spiders, and above all batches of eggs. It clings with its claws, which are very strong, to the vertical surfaces explored, without using its tail as a fulcrum. This bird, of the size of a skylark, has unusually beautiful plumage, of a light slate grey, with bright red, black and white on the wings. The throat is black, as is the tail: the latter is likewise bordered with black at the tip. The rich colouring of this bird, and its habit of hovering on the wing before the rocks which it is exploring, like those moths that hang suspended motionless in the air while they imbibe the nectar of flowers, have, in France, earned it the expressive name of *papillon des rochers*—"butterfly of the rocks." It is found in the Alps, the Pyrenees and the Jura. In winter it visits the ancient buildings in the towns.

The *Hoopoe* is before all remarkable for the twofold row of long russet feathers, bordered with black and white, which, at the will of the bird, lie back or stand erect on its head, expanding into a striking and beautiful crest. The rest of the plumage is a rosy buff, excepting the wings and tail, which are black barred with white. The Hoopoe is about the size of a ringdove. It is a bird of solitary habit, preferring the ground and rarely perching, unless on the lower branches of trees. It has a preference for damp meadows, which it traverses with a solemn step, from time to time displaying its handsome crest, either in satisfaction at

THE TREE-CREEPERS—THE HOOPOE 203

having found some acceptable morsel, or in surprise at the least alarm, for it is extremely timid. With its long bill it probes the soil for grubs, scarabæi, mole-cricket, and the like, or gathers up ants with its sticky tongue. When replete it goes away to digest at ease on some low branch. At mating-time it says *poo, poo*; whence, doubtless, the common French name of the bird—*puput*; and likewise its more usual name.

In France it is also called the *coq puant* (stink-cock, stink-bird) on account of the malodorous filthiness of its nest. The Hoopoe, so elegant in dress, is anything but a zealous and tidy housekeeper. The nest is made at the bottom of some hollow tree-trunk; it smears the cavity with a fetid mortar composed of mud and droppings, and lays upon this a bed of dried leaves and mosses. This deep-lying nest, which is difficult to reach, ought to be daily cleansed of the filth of the young birds. The Hoopoe does nothing of the kind; she lets the ordure accumulate until it forms a rampart all round the nest. This system of excremental entrenchment may be an excellent defence against the birds'-nester, who would not care to plunge his hand into this filth; so I will not too severely blame the bird for its malodorous method of building.

The Hoopoe is with us only in the summer. About September it crosses the Mediterranean and spends the winter under the warm skies of Africa.

XXV

THE CUCKOO

ON an old, leafy pear-tree right at the end of Uncle Paul's garden a blackcap had built its nest. Day after day Jules had discreetly watched the bird's labours ; he had seen the blackcap bring blade after blade of dried grass, interlacing them in the form of a cup and furnishing the interior with a lining of horse-hair. At last the eggs came ; there were five of them, a bright chestnut brown marbled with darker streaks. Gently parting the foliage in the absence of the mother-bird, and standing on tiptoe, Jules saw all this, of course without touching it, taking a quick glance at the pretty cluster of five eggs grouped at the bottom of the nest. There were no more to come ; Uncle Paul had told him that ; the process of incubation was about to commence, and in a few days five little creatures, blind and naked, would open their yellow bills for food at the least rustle of the foliage. Jules was already rejoicing at the thought of observing, from a distance, the rearing of the brood ; he wanted, when the nestlings were half-grown, to feed them in the nest himself, with a few rations of

small caterpillars and grubs on the end of a twig. Then the young blackcaps would leave the nest, and the garden would contain five additional grub-hunters, repaying the loving kindness of the child with their services and their joyous songs.

That is what he told himself yesterday ; to-day he returned from his inspection of the nest careful and troubled. A serious event preoccupied his mind : to the five eggs of the blackcap a sixth had been added, rather larger and of a different colour. Whence did this strange egg come ? Who had put it in the nest, and why ?—Uncle being consulted, went to the nest and returned with the egg.

PAUL.—Your blackcap's nest, my boy, has had a lucky escape ; if you had not inspected it the future brood would have been lost. The egg I have here is a Cuckoo's egg.

JULES.—I can't understand a bit why this egg was in a blackcap's nest, or what danger the future brood was in.

PAUL.—You will understand when I have told you something of the Cuckoo's habits. It's quite a long story, as you'll see, and a most curious one. The Cuckoo is the bird that in early spring, when the grass is starred with violets and the trees put forth their budding leaves, continually repeats *cuckoo, cuckoo*, in a plaintive, sonorous tone.

JULES.—I have often heard it calling at the edge of the wood, but I could not see it close at hand.

ÉMILE.—I have seen it fly away ; it seemed to me it was rather a big bird.

PAUL.—The Cuckoo is quite as large as a ringdove ; its plumage is a slaty-grey on the back, white on the belly, with numerous transversal brown stripes like those displayed by many of the hawks. The wings are long, as is the tail, which is spotted and tipped with white. Despite its costume, which imitates that of the goshawk and sparrowhawk, the Cuckoo does not belong to the category of birds of prey. Its toes are not strong enough ; its rather long beak is flattened and only slightly curved. These are not the crooked talons or the ferocious beak of a bird living by brigandage. Insects and caterpillars are the sole diet of the Cuckoo. You remember the processionary caterpillars of the oak-tree, those ugly black caterpillars that weave great silken nests against a tree-trunk, and whose barbed hairs cause such an intense itching ?

JULES.—When you were telling us about destructive pests you told us the Cuckoo ate them.

PAUL.—It feasts on them as on any hairy caterpillar ; but the hairs are rolled into pellets in the stomach and ejected by the beak. As a great consumer of insects and caterpillars the Cuckoo deserves our protection ; but it is a pity that a host of little birds, our devoted helpers, are the dupes of its treachery. Let us proceed to the facts.

The female Cuckoo never builds a nest. She has

no idea of incubating her eggs ; or rather let us say, in her excuse, that the structure of the breast does not appear to permit of a sufficient transmission of the heat necessary for the hatching of eggs ; on the other hand, as she lays her eggs at short intervals all through the summer, she would have no time to set up housekeeping. In short, this bird knows nothing of the tender joys of maternity ; incapable of rearing a family, not by any vicious perversity, but by fatal necessity, she abandons her eggs to the care of public charity.

JULES.—Then the Cuckoo's egg found in that nest in the garden would have been looked after by the blackcap ?

PAUL.—Precisely. Now, consider for a moment the astonishing combination of conditions that result in the alien egg being adopted by another mother. Do not forget that the Cuckoo lives entirely on insects. The nestling reared by a mother that is not its own mother must be supplied with caterpillars. Where will such food be found, if not in the nests of species addicted to a diet of insects, such as the warblers, the robins, the titmice, the nightingales, the fly-catchers, the wagtails and others ? It is precisely to their nests that the Cuckoo goes. Sometimes, however, she confides her egg to seed-eating birds, such as the linnets, the bullfinches, the greenfinches, the bramblings ; in this case a wonderful foresight determines her choice ; for while the adoptive parents

live on seeds they rear their families on grubs and caterpillars, which are more readily digested, and the young Cuckoo thus obtains its infantile diet in its strange home. On the other hand, her egg is never laid in the nests of quails, partridges or other species whose young live on seeds and grain from the time of leaving the egg. In the bosom of a family of different alimentary habits the young Cuckoo would infallibly die of starvation.

JULES.—But how does the Cuckoo looking for a nest in which to lay her eggs manage to tell the sort of food its owners live on ?

PAUL.—If it were by discernment I confess that the Cuckoo's sagacity would exceed that of man ; but the bird's choice, apparently so reasonable, is due to mere unconscious inspiration, such as we find in so many of the marvellous actions of instinct. A foreknowledge higher than ours has here devised all things to work together with success, without the considered participation of the bird. The egg, which in accordance with the size of the Cuckoo ought to be as large as that of the wood-pigeon or ringdove, is barely as big as the sparrow's, so that there may be room for it in the small nest of the blackcap, or even in that of the wren, and so that it may not arouse the suspicions of the adoptive mother by its disproportionate size. Moreover, this egg is variable in tint, as though to imitate in some degree the colour of the eggs with which it is to be incubated, some-

times in the nest of one species, sometimes in that of another. There are slate-coloured eggs, rusty-brown eggs, and eggs tinted with green or a pale blue. Some are very like sparrows' eggs; others are speckled with spots varying in colour and arranged without order, large or small, few or many; others, again, are marbled with black lines. Despite these variations it is always easy to tell which one of a clutch of eggs is the Cuckoo's egg. If among the eggs there is one which differs from the rest in form and colour this is certainly the Cuckoo's egg. By this alone I recognized the egg taken from the blackcap's nest.

JULES.—The five others are all as like as drops of water; the sixth, here, is very different.

PAUL.—So I am certain it belongs to the Cuckoo.

LOUIS.—The Cuckoo seems to me a very big bird to find it possible to get into a nest so small as a blackcap's, a robin's or a nightingale's, and lay its eggs there.

PAUL.—That is not how the bird sets about it. The egg is laid on the ground, on any convenient spot; then the mother takes it up in her bill, stows it away at the back of the throat, which dilates into a pouch to receive the egg, and flies off to the neighbouring thickets to search for a nest. When she has found a nest to suit her she stretches her neck over the edge, opens her bill and gently drops the egg in amongst the others. This done, the Cuckoo withdraws, never returning to the nest or taking note of

what may happen there. Other eggs are placed in like manner, here and there, one by one, in different nests.

JULES.—And the owners of the nest leave the Cuckoo in peace?

PAUL.—If they find the Cuckoo at their nest they receive the usurper with pecks and drive it away with fury, but as a rule the Cuckoo watches for a favourable occasion and goes to the nest furtively when the owners are absent.

JULES.—When they return they must at least see that there is a strange egg in the nest and throw it out?

PAUL.—By no means. Whether the sitting bird does or does not perceive that there is one egg the more in her clutch I should not care to say. In any case, since it is destined that Cuckoos should exist, matters are so arranged that the race shall not be extinguished; and all the eggs in the nest are incubated with the same diligence, the same maternal care; and all are hatched. At first all goes well enough; the nestlings do not require much food, and the parent birds can easily find grubs for one more mouth. The food is equally divided, the sons of the house getting no more than the stranger.

But the young Cuckoo grows more rapidly than the other nestlings; soon he will need for himself all the food that his adoptive parents can procure by their utmost efforts; he is for ever opening his great beak

and is always complaining of hunger. Then he finds the little house of wool and horsehair too close quarters. His naked body, red and flattened, his great head, his insatiable gulf of a beak, his great protruding eyes give him the look of a toad installed in the nest. There is no longer room in it for all; there is no longer food enough. Now an abominable deed is done. The young Cuckoo, with his rump and his wings, slips underneath one of the nestlings whose cradle he shares, gets it on to his back, which is hollowed like a saucer for the purpose, and holds it there with his slightly raised wings. Then, dragging himself backwards to the edge of the nest, he rests for a moment, makes an effort, and throws his burden outwards.

ÉMILE.—The wretch! He throws out of the nest the children of the bird that is rearing him?

PAUL.—Quite calmly, in order to get a bigger share. With his wing-tips he feels gropingly behind him for a moment to assure itself of the success of its crime and returns to the floor of the nest to heave up another nestling. All are served in this way, one after another to the very last; all are thrown out of the nest.

ÉMILE.—Oh, if only I were there! The wicked little beast!

PAUL.—What becomes of the poor little things, thus turned out of their home by the treacherous intruder? If the nest is far from the ground they are killed by their fall and the ants at once proceed to dissect them.

If it is near the ground a few may survive their bruises and take refuge in the moss where the mother will console them and bring them food. The Cuckoo is now alone.

JULES.—I hope the ugly toad will starve to death now in the nest ! The father and mother whose brood has perished so wretchedly will not take him any more food.

PAUL.—There you are wrong. They continue feeding him abundantly as though nothing had happened ; they perform miracles of activity to satisfy his hearty appetite ; they give themselves not a moment's rest so that they may find food for this ever-open mouth, wide enough to swallow the foster-parents themselves !

JULES.—Isn't the blackcap afraid of a greedy nursing who could swallow her ?

PAUL.—Although she is only its foster-mother, and that by chance, she is entirely possessed by the sacred affections of maternity. She comes joyfully bearing a caterpillar in her beak. The Cuckoo gapes on the edge of the nest, ugly as a little monster. Without the slightest fear the blackcap administers the mouthful by thrusting her head into the yawning gulf. The gulf closes, swallows the food and yawns again, asking for more. The mother hurries off to find it.

JULES.—What unselfishness, and for the bird that has just ravaged her nest !

PAUL.—It must be so, or long ago there would have

been an end of the Cuckoos that rid us of the poisonous caterpillars.

JULES.—All the same, I don't like the bird.

And Jules took up the Cuckoo's egg found in the nest in the garden. "May I?" he asked his uncle, with a gesture.—"You may," replied Paul, who would rather have five home-keeping warblers in his garden than one vagabond Cuckoo. And—smack!—the egg lay smashed on the ground.

XXVI

THE SHRIKES

PAUL.—The popular imagination has seen fit to improve on the singular habits of the Cuckoo ; fable has added its extravagances to truth, already so strange. Even in these days many absurd tales are told of the Cuckoo. I will tell you two of these, to put you on your guard against such childish beliefs.

To begin with, it is said that twice a year the Cuckoo changes its nature. It is a Cuckoo all the spring and a Sparrowhawk the rest of the year. It comes to us in April from far away, on the back of the Merlin, which kindly gives it a lift as its wings are still weak, as a result of the process of transformation. It is undoubtedly the plumage of the bird, which, as I have told you, reminds one, by the brown transversal bars on the breast, of that of some of the Hawks, that has given rise to this tale of the metamorphosis of the Cuckoo into the Sparrowhawk, and of the Sparrowhawk into the Cuckoo. Some simple-minded observers have been deceived by this similarity of costume. In April and May, when the bird sings, it is a Cuckoo ; in summer, when it is mute, it is a Sparrowhawk,

since it has the plumage of one. Therefore the Cuckoo turns Sparrowhawk, and the Sparrowhawk turns Cuckoo again. For thousands of years this wretched reasoning has convinced the great majority.

The Cuckoo is a migrant. It remains in Europe from April to September, and returns to Africa before the approach of winter. To explain its reappearance in the spring someone invented the tale of the Merlin carrying it on its back. Needless to say there is not a word of truth in the story. The Cuckoo is always a Cuckoo ; it returns from the warm south on its own wings, just as the swallow returns. Then there are those that pretend that the Cuckoo changes into a toad.

JULES.—Isn't that because the Cuckoo, when it is still in the nest, and unfledged, is very ugly, and looks like a toad ?

PAUL.—Precisely.—Then the Cuckoo is accused of spitting on plants, and its saliva—the so-called Cuckoo-spit—is said to give birth to insects. The actual truth is that a very small insect, a bright green in colour, in shape like the Cicada, has a habit of pricking, with its sucker, the stems of plants, in order to make the sap ooze out. The sap then collects in a fleck of white foam having the appearance of saliva. The insect lives in the midst of this mass of fresh foamy sap, in order to drink at its ease and avoid the heat of the sun. That is all. The insect is called the *Cercopis* ; and the injury it does to the plant on which

it lives is insignificant. The supposed saliva of the Cuckoo is in reality the result of the ingenious method which an inoffensive little creature employs to keep itself cool. Many other things also are said of the Cuckoo : it would be waste of time to linger over them.

Already I have told you of dubious helpers, who make us pay for their services by committing grave offences. You have seen that devourer of hairy caterpillars, the Cuckoo, guilty of the blackest ingratitude to its foster-mother, the blackcap, brutally ejecting the nestlings whose nest it usurps, and which would have become irreproachable hunters of grubs and caterpillars and other vermin ; so that we pay rather dearly for its services. To complete my talk of these birds, whose behaviour, from the farmer's point of view, merits an exasperating mingling of praise and condemnation, let me tell you of the *Shrikes*, which are great destroyers of insects but also barbarous killers of nestlings.

Despite their small size—and even the larger are no bigger than a thrush—the Shrikes display the ferocious boldness of the larger birds of prey. They will even go to the length of pursuing the falcon if it ventures to approach their nest. They live principally on large insects ; unfortunately they also pounce upon little birds, greedily devouring their brains and afterwards tearing their flesh into shreds. For this life of rapine they are equipped with a strong hooked beak, with a tooth-like projection near the

end of the upper mandible ; strong toes, armed with sharp claws that resemble, on a smaller scale, the talons of the birds of prey. There are four species of Shrike in our country.

The *Common Shrike*, or *Great Grey Shrike*,¹ is the size of a blackbird ; it is a light ashen grey on the back and white on the under parts. A wide black streak, starting from the beak, surrounds the eye and covers the cheek. The wings and tail are black, relieved with white. The Grey Shrike loves to perch on the topmost twigs of a tree, whence it repeats incessantly its call, *trui, trui*, in a shrill tone. When it flies from tree to tree it seems at first to intend alighting on the ground, but then rises again, describing a graceful curve in the air. Its diet consists principally of field-mice and large scarabæi ; more rarely of small birds, which it seizes on the wing. The nest is situated by preference in a dense, thorny hedge. It contains four to six eggs, of a pale rust-colour, surrounded, toward the large end, with a band of brown spots. A similar band of spots is found round the larger end of all the Shrikes' eggs, furnishing a distinctive feature of the most definite kind.

The *Lesser Grey Shrike* ² is easily recognized by the wide black band on the forehead. It is about the size of the skylark : its plumage, except for the belly, which is a pinkish buff, resembles that of the Great

¹ A winter visitor, and a regular autumn and occasional spring emigrant, which does not nest in England.—Tr.

² Only an occasional wanderer in Great Britain.—Tr.

Grey Shrike. In the eggs, which are white with a warm buff tinge, the band surrounding the large end consists of a profusion of small rusty-red, brown or purplish spots.

The *Woodchat*¹ is rather smaller. The top of the head and the neck are a bright chestnut red, the belly and rump white. For the rest the plumage conforms with that of the two foregoing species.

The *Red-backed Shrike*, or *Butcher-bird*,² is the smallest and most widely distributed of the Shrikes. The head and rump are grey, the back a warm chestnut red, the belly a rosy buff. A black band surrounds the eye. The throat is white; the large feathers of the wings and tail are black.

These last three species readily imitate the warbling of small birds and are said to employ this talent in luring them into deadly ambush. The Butcher-bird especially is an expert in this kind of treachery. He hides in the heart of a bush to imitate the song of the birds which he hears warbling about him. The imprudent birds draw near in response to his call, thinking him one of their own kind, and the butcher pounces on them when they come within his reach. This ruse, however, succeeds only with young and inexperienced birds; the older ones know the trick and are careful not to be taken in by it. The bird

¹ A rare wanderer in England; it does not nest farther north than the North of France.—Tr.

² A late emigrant, nesting in some parts of Southern England.—Tr.

seized is flayed before it is eaten, whence its French name of *écorcheur* (flayer, knacker). For that matter, the other Shrikes partake of this habit. As they cannot assemble the feathers into pellets in their stomachs, and then eject them, after the fashion of the Owls, they take the precaution of preparing their game by tearing its skin away in shreds. This is a very expeditious method of plucking it. Despite its treacherous call, which is a perfect imitation, the Butcher-bird does not succeed every day in making dupes; the suspicions of the small birds outwit his treacherous talents. The Shrike is then content with common mice, field-mice, grasshoppers, cockchafers and large scarabæi, especially those whose larvæ lies in rotting wood. Its passion for the scarabæi is so extreme that even when replete it will continue its hunting merely for the pleasure of the chase. Not knowing what to do with the insects captured, it impales them on the thorns of the bushes. Perhaps in this way it makes itself a larder in which the meat can hang until sufficiently high for its taste.

The other Shrikes also have this odd habit of collecting a store of impaled beetles, a store which to the bird does not always return, so that the game shrivels unused on the bush. But we need not be concerned about this waste of game; the final result is excellent, from one point of view; we are rid of no small number of enemies by these fervent hunters. In the light of such services can we regard it as an

unpardonable crime if they sometimes treat themselves to a fledgling? For my part I should hesitate to do so. I pity with all my heart the poor little bird that foolishly runs into the Shrike's ambush, but I pity, too, the beautiful tree which, deprived of defenders, would fall a victim to the larvæ of the goat-moth and be riddled by holes full of decay.

The Butcher-bird frequents copses, orchards and gardens, nesting in thick hedges, or sometimes amongst the interlacing branches of apple-trees. The eggs are white, faintly tinged with a warm buff. The band round the large end consists of brown, grey and greenish spots. In building the nest it makes use of a sort of wild "everlasting" or *immortelle*,¹ frequent in the fields, whose stem and leaves are abundantly covered with a white cottony down; the interior of the nest consists of small twisted twigs and fine roots, interlaced and warmly lined with wool, down and horsehair. The other Shrikes make use of the same materials, and especially the *immortelle* with the white downy leaves.

¹ The *Filago* or *Micropus* of the botanists, known in Provence as *erbo d'ou tarnagas* (the Shrike's Herb).

XXVII

THE TITMICE

PAUL.—Now we come to some hunters of larvæ which give us no cause for any real complaint ; and first of these are the *Tits* or *Titmice*.

These are small and attractive birds, quick and petulant, always in movement, fluttering incessantly from tree to tree, carefully inspecting the branches, hanging from the tips of the slenderest twigs, clinging to them in all sorts of positions, often head downwards, following the swaying motion of their flexible support without releasing their hold, without ceasing their examination of worm-eaten buds, which they tear to pieces in order to extract the grubs and eggs contained in them.

It is calculated that a Titmouse will consume as many as 300,000 insects' eggs in the course of a year ; it is true that the bird has to provide for the needs of a family of a size very rarely exceeded. Twenty nestlings and more in the same nest are not beyond the capacities of this active bird. It is during the nesting season that the bird has to inspect the buds and the crevices in the bark of trees in search of grubs,

caterpillars, spiders and small vermin of all sorts, in order to provide food for the twenty beaks always gaping with hunger at the bottom of the nest. The mother-bird arrives with a caterpillar ; the whole nest is aroused ; twenty beaks open ; one alone receives the tit-bit ; nineteen are left expectant. The Tit departs immediately on another trip ; she returns, and is off again, indefatigable, and when the twentieth is fed the first has for a long while been gaping anew with hunger. I leave you to imagine the quantity of vermin which such a family can consume daily. Consequently I commend the Tits highly as diligent cleansers of our orchard. I know they are accused of tearing open and destroying the buds. Their crime is only apparent. When they tear a bud to pieces it is only in order to get at some tiny grub lodged among the scales ; it is not the young leaves or flowers that they are after. It is better that the worm-eaten bud should disappear ; it would have come to nothing, and the enemy concealed in it would leave its posterity to ravage the tree the following year.

LOUIS.—Don't the Tits eat vegetable food ?

PAUL.—No ; unless, now and then, some seed, such as hemp. They must have animal food ; above all small insects of all species, their eggs and larvæ. Their appetite for prey is so eager that they have the audacity to attack small birds when enfeebled or taken in snares, beating out their brains with their beaks and greedily eating them. It is a fact that the



TITS, WREN AND GOLDCREST.

a, Great Titmouse. *b*, Blue Titmouse. *c*, Long-tailed Titmouse and nest. *d*, Penduline Titmouse and nest. *e*, Wren. *f*, Goldcrest.

($\frac{1}{3}$ natural size.)

Tits are most courageous birds, despite their small size ; extremely quick and active, petulant and quarrelsome, and regular little ogres in time of famine. The beak is conical, strong, short and sharp ; the toes have curved claws like the talons of birds of prey, and are adapted for seizing and holding. The bird profits by this faculty in order to hold its food and carry it to its beak with its foot as do the parrots.

After the nesting season the Tits unite into bands consisting of one or two families, and travel in company, by short stages. These companies seem to be led by a chief, apparently the father or mother ; they call one another incessantly from tree to tree, uniting for a moment and then dispersing again, once more to unite at the call of their leader. Their flight is brief, light and uncertain. They scatter through the woods, gardens, fields and orchards, inspecting the trees and bushes, adroitly capturing insects and larvæ, clinging with their little feet to the tips of bending reeds and rushes, and hunting in every possible attitude.

There are many species of Tit ; we in France have eight. I shall tell you only of the principal species.

The *Great Titmouse* is the largest ; its size is that of the robin. The back is a bluish-green ; the breast and belly yellow. The head is a fine glossy black, a wide band of black divides the breast and belly and surrounds the cheeks, which are white. The longer wing-feathers are edged with slate-blue.

The Great Titmouse is common in copse and garden.

This is the bird that in autumn, as it reaches the bark of the fruit-trees, repeats the cry *titipu, titipu, titipu*, and as its voice has sometimes the screeching sound of a file, it is in some districts known as the *Locksmith*. It nests in some hole in a tree-trunk, which it lines with soft silky materials, consisting principally of small soft feathers. The eggs are in number fifteen or thereabouts; white with bright rust-red spots, especially toward the larger end. To feed its family the Titmouse has to find no less than three hundred caterpillars daily, or the equivalent in other sorts of vermin. The debt which the gardener, the nurseryman and the forester owe this valiant vermin-killer is, by the end of the year, past all reckoning. Yet I have seen such angrily plunge their arms into the cavernous trunk of some old apple-tree to pull out the nest of the Titmouse and cast it to the winds—eggs, feathers and newly hatched nestlings. And they thought they were performing a meritorious action, for according to them the Titmouse eats buds. But no; again I tell you the Titmouse does not eat buds; it eats the tiny grubs lodged amidst their scales, and is too wise and sharp-sighted to attack healthy buds, which contain nothing of any use to it. So leave it in peace, to its work of tearing open the worm-eaten buds, for it can always tell them from the others.

As a variation of its diet the Titmouse does not disdain a little hempseed, or a hazel-nut, whose kernel

it extracts with an adroit use of beak and foot, I had almost said hand, of which no other bird is capable. The sparrow, chaffinch, linnet and others crack the hempseed between their mandibles; the Titmouse seizes it in his claws, lifts it adroitly to his beak, and cuts in the husk a tiny round hole through which the seed is emptied, as we empty an eggshell of its contents. The hazel-nut is treated with the same dexterity.

The *Blue Titmouse*, or *Blue-tit*, is a beautiful little bird which often travels in company with the Great Titmouse and frequents gardens and orchards. The back is olive-green, the breast and belly yellow with a greenish tinge; the crown of the head is a fine azure blue, the forehead white, and the cheeks white, framed in black. A little black collar runs round the nape and the sides of the neck. The long feathers of the wings and tail are edged with blue. This Tit, with its handsome plumage and graceful movements, always running up the bark of trees and twisting round their branches or hanging suspended from the tips of the yielding twigs, always pecking and foraging, is the peer of the Great Tit as a killer of vermin. It has been known in a few hours to clean a rose-tree of two thousand greenfly or "blight." Caterpillars, and the eggs of insects, especially those that attack fruit, form its principal diet. It has a strong liking for the brains of little birds, but at need will put up with hempseed. Like the Great Titmouse, it builds its

nest in some hole in a tree. The nest, carelessly built, consists of a mass of small downy feathers. No other species rears so large a family. There are often more than twenty eggs ; they are white, with red-brown spots, chiefly at the large end.

Two other Tits, less important as killers of vermin, build their nests with wonderful art. These are the *Long-tailed Tit*, or *Bottle-Tit*, and the *Penduline Tit*.

The *Long-tailed Tit* is distinguished from all the other tits by the excessive length of the tail, which is longer than the body. It lives in the woods during the warmer months and enters our gardens and orchards only in the winter. It is a small bird, hardly larger than a wren. The back is a reddish-grey, the under parts white ; the belly has a faint russet tinge ; the nape and cheeks are white.

The nest is sometimes set in the fork of the upper branches of a bush, sometimes in the midst of a dense thicket, a few feet from the ground ; but it is oftener built against the trunk of a willow or poplar. Its form is an elongated oval, or rather that of an enormous cocoon enlarged at the base. The entrance is in the side, about an inch from the top of the dome. The outer shell consists of lichens like those that grow on the supporting tree, in order to deceive the eye, which fails to distinguish it from the bark. Fibres of wool hold the nest together. The dome, the better to resist the rain, is a dense felt of moss and cobweb. The interior is like the cavity of an oven with a cup-

shaped floor and a very high roof. This form is the most favourable to the conservation of heat. A very thick layer of silky feathers forms the bed of the nest. On this lie sixteen to twenty nestlings, arranged in orderly fashion in the narrow cup, no larger than the hollow of the hand. By what miracle of parsimonious installation do these twenty little creatures, with their mother, find room in such a lodging? How can such long tails grow there? We might seek in vain for a finer example of economy of space.

ÉMILE.—How I should like to see the twenty little Tits in their nest!

PAUL.—I had once the good luck to do so. Even to-day I feel a thrill of emotion when I think of the score of tiny heads rising from the bottom of the nest, trembling and opening their beaks as at the approach of their mother. I quickly took a glance at this delightful spectacle through the door of the nest, and withdrew. Already the parents were there, their feathers ruffled with anxiety. But you needn't be afraid, little birds, so vigilantly careful of your family; Uncle Paul would never commit the sacrilege of touching your nest.

ÉMILE.—Nor would Émile.

LOUIS.—Nor Jules, nor Louis.

PAUL.—I hope they wouldn't; or Uncle Paul would tell them no more stories. . . .

The nest of the *Penduline Tit* is still more remarkable. This Titmouse is found practically nowhere but

along the banks of the lower part of the Rhone. It hangs its nest high above the ground from the end of some flexible branch of a tree on the river-bank, so that the cradle of its family is gently rocked by the river breezes. It is a sort of oval purse about the size of a wine-flask, having near the top, on one side, a narrow orifice which is prolonged into a short tube, which will at most only just admit the thumb. To pass through it the Titmouse, tiny as it is, has to force the elastic walls, which yield a little and spring back again. This wallet is made of the silky down that escapes in May from the ripe catkins of the poplars and willows. The bird assembles and consolidates the flakes of silky cotton with a web of wool and hemp. The resulting tissue is like the coarse felt of a hat. I have tried in vain to imagine how the bird contrives, with beak and feet, to weave a stuff that the human hand, left to its own resources, would be powerless to achieve; and this without any apprenticeship and without hesitation, without ever having seen the thing done by another. At its first attempt the Titmouse surpasses the skill of our fullers and weavers. The top of the nest comprises in its thickness the end of the supporting branch and its terminal twigs, which serve as a framework or scaffolding for the dome; but the leaves emerge from the sides of the wallet and protect them with their shade. Finally, to anchor the nest more firmly, a cordage of hemp and wool is twisted round the upper twigs of the branch surround-

ing the nest, while the lower twigs are distributed through the substance of the felt. The interior of the dwelling is padded with poplar-silk of the finest quality. The parent birds require three weeks of the most assiduous labour to construct this marvellous nest.

ÉMILE.—Doesn't the rain come through the walls of the nest ?

PAUL.—The felt is so thick and so close that even in the most pouring rain not a drop of water enters the silken house.

ÉMILE.—How cosy the Tits must be in their nest ! The wind rocks them gently above the water ; from their little window they see the river flowing. What is this clever Penduline Titmouse like ?

PAUL.—Slate-grey, with brown wings and tail and a black band on the forehead. Its costume is simple, you see, as is always the case with people of real worth. The Blue Titmouse has rich plumage, but it knows no better way of making a nest than to heap up feathers at the bottom of a hole in some tree ; the Penduline is modest in its plumage, but it displays an incomparable skill in building the most wonderful nest you could hope to see. To each his lot : talent or fine clothing.

JULES.—We would all rather have the first.

PAUL.—Always remember that noble sentiment.

JULES.—We should be very forgetful of your teaching if we ever thought otherwise.

ÉMILE.—And the eggs : what are they like ?

PAUL.—Émile won't let me be on the subject of the Penduline. You are greatly interested in this maker of felt nests ?

ÉMILE.—Oh, yes !

PAUL.—Well, the eggs are quite white and rather long. There are three or four.

ÉMILE.—No more, when the other Tits have twenty ?

PAUL.—No more ; but in compensation there are two broods a year.

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XXVIII

THE WREN AND THE GOLDCREST

PAUL.—Here is another highly skilled architect, a past master in the building of nests. It is the *Troglodyte*, or *Wren*. If you ask me the meaning of the strange-sounding word, Troglodyte, I shall reply that it is a Greek word, meaning one who lives in holes. Some nomenclator, who was more anxious to air his Greek than to make himself clearly understood, thought fit to give this name to the little bird that ferrets out holes like a mouse. Perhaps my description will be more readily understood. The Troglodyte is a tiny puff of feathers, brown as a woodcock's, which with drooping wings and beak in the air and tail raised over the rump is for ever frisking and jumping and warbling: *teedereet, teereet, teereet*.

JULES.—I know it—a bird no bigger than a walnut. It roams round the house every winter; it runs round and over the wood-pile; it pops into the holes in the walls; it makes its way into the densest thickets. From a distance you would think it a cheeky little mouse.

PAUL.—That's right; that is the Troglodyte, the

Wren. In summer it lives in the leafy woods. Then, under the arch of some great roof, just rising above the ground and covered with a dense fleece of moss, it builds a structure with walls like those of the Penduline's nest. The materials are shreds of moss, so that the building may be confounded with the foundations; and they are made into a big hollow ball with a very small hole at one side. The interior is lined with feathers. At other times it chooses, for the site of its nest, a thatched roof, a thick-leaved ivy-plant, a pile of logs or a natural cavity in the bank of a shady brook. The clutch consists of some ten white eggs, with red-brown spots sprinkled over the large end.

When the weather grows chilly the Wren leaves the woods and approaches the farmhouses. You may then see it, always busy, always on the move, popping into the dark interstices of wood-piles, old walls, dead trees and dense thickets, to inspect every chink and crevice in its search for all the species of vermin that take up their winter quarters in the crevices of bark and the chinks of mortared walls. It is enough to see it once, foraging in a mass of brushwood, coming and going through all the passages between the branches, popping in and out, out and in again, to be convinced of the activity of its search.

JULES.—Yes, but it is so tiny that it cannot do much.

PAUL.—If the Wren were to hunt large game its

bag, by the end of the day, would certainly be small. What would so tiny a bird make of a cockchafer? It wouldn't get to the end of its only too-abundant meal for days!

JULES.—And it would be too hard for its beak.

PAUL.—It must have the smallest of caterpillars, the almost imperceptible midges. These are softer tit-bits, better suited to its slender gullet. I need not remind you that the most formidable enemies of the farmer are precisely the smallest. A negligible grub endangers our cereals; others so small ravage our fruits in the bud. What does it take to destroy a flower which will produce a pear the size of your two fists? One single grub, so small as to be barely visible. Well, the Wren attacks these pigmy destroyers, which are all the more to be feared in that they escape our vigilance by their minute size. Now guess how many small caterpillars a Wren would require daily to feed her brood. Observers, whose patience I admire, have counted them.

JULES.—Say ten caterpillars for each nestling and ten in the nest; that would mean a hundred caterpillars daily. That is a large number.

PAUL.—A large number, but you are a long way from the truth! On an average, the Wren takes food to the young thirty-six times in the hour. She gives them a mixture of insects, larvæ and eggs. By the end of the season the number of insects destroyed, in one form or another, may be as great as fifteen

thousand. We have gone a long way beyond the small number which you calculated, my poor Jules !

JULES.—The caterpillars must be very tiny, or the nestlings would die of indigestion !

PAUL.—That's true ; they are very small, and then many of them are still in the egg. The result is of no less importance to us ; so many eggs swallowed means so many ravagers the fewer in the future.

LOUIS.—Then supposing the Wren were to select only those vermin that attack pears, the little bird would save us fifteen thousand pears in the course of the day ?

PAUL.—Evidently.

LOUIS.—It's incredible !

PAUL.—I admit the result is prodigious compared with the means at work. A tiny bird, unnoticed, goes pecking hither and thither. Taking everything into account, by the end of the day it is found that this insect-hunter has destroyed in the egg, or the nymph, or the perfect stalk, thousands of insects which, if left alive, would have deprived us of hampers upon hampers of fruit, and hundreds of bushels of corn. If we were to calculate the value of the goods which are saved for us by the vermin-eating birds, we should arrive at fabulous sums. We owe peace and protection to these valiant workers, who keep famine from entering our houses.

Now we are dealing with the subject, let us consider another Tom Thumb of the birds ; like the Wren, an

THE WREN AND THE GOLDCREST 235

ardent exterminator of vermin. I mean the *Goldcrest*, whom the French call the *roitelet* or "kinglet," because of the little golden crown, edged with black, that it wears on its head. It is the smallest of our birds. It is olive green on the back and a yellowish-white on breast and belly. The gay feathers of its crown can be erected in the form of a crest.

The Goldcrest nests in the colder European countries, especially in the pine-forests of Norway. Its nest is a ball the size of one's fist, open at the top, skilfully constructed, as to the outside, with moss, wool and cobwebs; inside it is lined with the softest down. It lies flat on the bark of a pine-tree, at an inaccessible height. The eggs, numbering six or eight, are a uniform flesh-colour.

Although in appearance a fragile creature, the Goldcrest most valiantly endures the cold. It reaches us in little companies from its native country about the time of the autumn mists, or at the fall of the leaf. These companies, numbering five or six birds at most, scatter through the woods and public parks and orchards to inspect the crevices of the bark, search the heaps of dead leaves and examine the buds, clinging to the tips of the smallest twigs. Even the Titmouse is not a more skilful gymnast; it cannot beat the Goldcrest at hanging head downwards and working in all positions. The work of insect-hunting is accompanied by a continual little rallying-cry: *zi-zi-zi*, *zi-zi-zi*. The Goldcrest is full of confidence

in humanity. Fearless of the footsteps and voices of the passers-by, it continues its evolutions, its pursuit of insects, its cry of *zi-zi-zi*. It will let you approach it so closely that you might think it possible to take it in your hand. But the cunning little fellow, who seems not to perceive you, so busy is he, removes himself by a quick, sudden flight, and proceeds with his labours a few branches higher from the ground.

XXIX

SWALLOWS AND MARTINS

PAUL.—There are whole tribes of helpers—Woodpeckers, Tree- and Wall-creepers, Wrynecks, Nuthatches, Tits, Goldcrests and other birds—that devote themselves patiently to searching for insects' eggs in the cracks and chinks of bark and in heaps of dead leaves, for larvæ amidst the scales of buds and in rotting wood, and for insects in the crevices where they harbour. In this sort of hunting the bird does not have to pounce upon the game, to rival it in swiftness ; it is enough to discover where it is lodged. For this purpose it needs a perspicacious eye and a slender, tapering beak ; the wings are only of secondary importance. But there are other tribes of birds that devote themselves to the actual chase, in the air, of flies, moths, gnats and beetles. They need only a short bill, but it must open wide, to snap up the prey on the wing despite the uncertainties of a sometimes imperfectly controlled flight ; a bill in which the prey is engulfed, automatically, without a moment's slackening of the hunter's pace ; and the interior of the beak should be viscous, so that moth or midge has

only to graze it with its wings, and it will be held captive as by bird-lime. The mouth of the Bat, that other winged hunter, which opens from ear to ear, must be its model for the width of its opening. But it must before all have swift and indefatigable wings, which will not be wearied by the desperate flight of the swiftest game, nor be baffled by the tortuous course of a moth at bay. A beak that opens to a disproportionate width and wings of excessive size—such, in brief, should be the bird that hunts in the air.

At the head of such birds is the Swallow, the daylight bat, as the Bat is the twilight swallow. Both creatures hunt flying insects, incessantly coming and going, crossing and recrossing their own track in a thousand directions; engulfing their prey in their wide gullets and passing on without a moment's delay. But how the Swallow excels its nocturnal colleague, the dismal Bat, in grace of form, in swiftness of flight! We may compare them in the services they render and their mode of hunting, but not in any other respect.

“Flight is the natural state of the Swallow; I might almost say, its necessary condition. It eats while flying, bathes while flying, and sometimes even feeds its young on the wing. It slips through the air without effort, with ease and freedom; it feels that the air is its domain; it explores it in all its dimensions, in all directions, as though to enjoy it in all its details, and its pleasure in this enjoyment is revealed by little cries of delight. Now it gives



SWALLOW, MARTINS, SWIFTS, NIGHTJAR.

a, House-Martin. *b*, Swallow. *c*, Sand-Martin. *d*, Swift.
e, Alpine Swift. *f*, Nightjar or Goatsucker.

($\frac{1}{3}$ natural size.)

chase to the fluttering insects and follows, with supple agility, their oblique and tortuous track ; or relinquishing one to pursue another, it captures a third in passing ; now it lightly grazes the surface of the ground, or the water, to seize those gathered there by rain or moisture ; now the bird itself evades the impetuous rush of the bird of prey by the swift flexibility of its movements. Always the master of its flight, even at its topmost speed, it changes its direction any moment ; it seems to describe, in the tide of air, a mobile, fugitive maze, whose paths cross, interlace, approach, coalesce, evade and involve one another ; rising and falling, disappearing and returning, again to cross, again to become entangled in a thousand ways ; a maze whose plan, too complicated to be presented to the eye by the draughtsman's art, can barely be suggested to the imagination by the brush of the word-painter." †

We have in France three species of the Swallow tribe. The most widespread is the House-Martin ; the back is black with gleams of blue ; the belly and rump white. It builds its nest under house-eaves and cornices, or window-sills ; its building material is finely divided earth, chiefly that rejected by the earth-worms in little heaps, in field and garden, after they have digested it. Of this the Martin fetches beakful after beakful, mixing it with a little viscous saliva to give it cohesion, and lays it in courses, con-

† Guéneau de Montbéliard, in Buffon.

structing with it a semi-bowl, adhering to the wall and pierced, in the upper part, by a narrow opening. Shreds of straw encrusted in the thickness of the structure give greater strength to the earthen wall ; and the interior is padded with a quantity of soft small feathers. The eggs number four or five ; they are a flawless white.

The nest serves the same pair of birds for several years in succession ; on the arrival, in the spring, they return to them and repair them until they are as good as new. If some are left untenanted, their owners having died in a distant country, the new couples take advantage of them.

JULES.—Do they never quarrel for the possession of the old nests ?

PAUL.—Very rarely. Martins like to live in company ; their nests often touch ; there are sometimes hundreds under the same cornice. Each couple recognizes its own property without hesitation and has a scrupulous respect for the property of others, provided its own is respected. There is a strong feeling of solidarity among them ; they assist one another, both intelligently and zealously. It sometimes happens that a newly built nest crumbles and falls, either because of a lack of cohesion in the mortar employed, or because the masons, being in too great a hurry, have not had the patience to let one course dry before laying another ; or for some other reason. At the news of the disaster the neighbours flock to

console the afflicted pair and help them to rebuild the nest. All set to work, bringing the finest mortar, straws and feathers ; with such energy that in two days' time the nest is rebuilt. Left to their own resources the afflicted pair would have spent a fortnight in repairing the disaster.

ÉMILE.—They are friendly birds ; they are the sort of birds I like !

PAUL.—I can tell you something even better. A Martin foolishly got entangled in some threads. The greater its efforts to free itself, the more it got entangled. There it was, with fettered wings and feet, in peril of death. With a cry of anguish it called its companions for assistance. All hurried to the rescue, held a noisy consultation, and worked to such effect with beak and foot that they disentangled the snare and set the captive free. The happy event was celebrated by the most heartfelt warblings of delight. This is what I saw myself one day, in the garden here, when Mother Ambrosine was bleaching, in the sun, the threads of hemp that she spins on her distaff.

A celebrated writer ¹ has borne witness to a similar fact. I will let him describe it in his own words : " I have seen a Martin that had somehow unfortunately caught its foot in the running noose of a string the other end of which was fixed to a gutter. Its strength exhausted, it hung, crying, at the end of the string, which it lifted, from time to time, in

¹ Dupont de Nemours.

its efforts to fly. All the Martins of the neighbourhood assembled, to the number of several thousands. They made a cloud about it, all uttering cries of pity and alarm. After long hesitation one of them devised a means of liberating their companion, communicated it to the others, and set to work. They cleared a space round the victim, and then those nearest came one by one, each in turn, like soldiers tilting at the ring, to give a peck at the string as they passed. These pecks, delivered at the same point, followed one another at intervals of a second or less. Half an hour of this work sufficed to cut the string and set the captive free. But the flock of martens, only slightly thinned, remained until nightfall, still conversing, in tones that were no longer anxious, as though gossiping together and congratulating themselves." And again: "An insolent sparrow entered the nest of a House-Martin, found it comfortable and proposed to settle down in it for good. The owners set upon the intruder, but the sparrow, stronger in the beak and protected by the walls of the nest, easily repulsed their attacks.—Oho, you refuse to clear out! We shall see!—One of the pair of Martins continued the blockade of the narrow entrance-hole of the nest and the other went to seek aid. The neighbours came, took stock of the situation, deliberated as to the means to be taken, and recognized that it was impossible to dislodge the enemy by force, ensconced, as he was, as in a fortress. One opinion prevailed among

the councillors : if the nest could not be taken from the sparrow at least the owner must be avenged. No sooner decided than done. While a few bold Martins, posted at the entry, intimidated the inmate by their cries, the others brought the customary mortar of earth tempered with saliva and gradually closed the entrance to the nest."

JULES.—Who got the worst of it ?

PAUL.—The foolish sparrow, walled up in the narrow cell. He perished there.

ÉMILE.—He was trapped, the nest-robber !

PAUL.—The *Common Swallow*, sometimes called the *House-, Barn- or Chimney-Swallow*, has the forehead, throat and eyebrows of chestnut red ; the back is black with purplish reflections and the belly white. It is called the House-Swallow because it seeks the neighbourhood of man and nests even within the walls of our houses, especially where there is little noise or movement. Uninhabited rooms open to the weather, sheds and outhouses, gables, the under side of balconies, the inside of tall chimney-stacks, are its favourite building sites. The nest is built of clay worked into mortar, mixed with hay and straw, and lined with dried grass and feathers. Its form is that of a cup or dish, fully open at the top. The eggs number four or five. They are white, speckled with small brown or purple spots.

The Common Swallow is the most interesting of its tribe. It is the cheery companion of the ploughman

and the farmer's wife, while the House-Martin prefers the towns and the cornices of public buildings. Its warbling is a sweet little song which the male bird, on the side of the nest, repeats continually to his mate, to while away the long hours of incubation. The Swallow is met with in every part of the world. It reaches us after its long voyage about the 1st of April, twelve days before the arrival of the House-Martin, and a month before the Swift.

The *Sand-Martin* is the smallest and least widespread of the three Swallows. The back, cheeks and a band across the chest are brown; the throat and belly are pure white. With beak and claws, fragile tools for so rude a task, if the energy of goodwill did not supplement their strength, it excavates, in the perpendicular banks of sandy soil beside the banks of streams, or in precipitous cliffs and quarries, a long tunnel, narrow at the entrance, winding in its course, and some two feet in length. The extreme end of the tunnel is enlarged, and is furnished with a thick bed of straw, dried grass and feathers, massed together without art. On this lie five or six white and slightly translucent eggs. The Sand-Martin never alights except on the rocks, to which it easily clings with its long pointed claws. It keeps, by preference, to the banks of streams, which it explores with a rapid flight, going and coming along the same track, to snap up the midges attracted by the cool moist atmosphere.

JULES.—They say the Swallows make long journeys.

PAUL.—Yes, all our Swallows change their country every year ; not because of a vagabond nature, but of necessity. Many other birds, and chiefly those that feed on insects, are in the same case. The Swallows, like the Bats, feed exclusively on the insects that fly and hover in the air. When the cold weather comes there are no such insects to be found. What does the Bat do then to save itself from death by starvation ?

ÉMILE.—It goes to sleep.

PAUL.—It checks the draught of the vital furnace to the utmost possible extent ; the draught of that natural furnace which, as you know, produces the heat and movement and life of our bodies by the combustion of the blood by means of air ; it almost ceases to breathe, to economize the fuel stored in its little veins and make it last until the insects reappear on the return of spring ; it sleeps, in the recesses of some cave or hollow, a sleep that is almost like death. The birds have not the faculty of thus abating life, of temporarily suspending it ; they are the most active living furnaces we know, always burning at full draught, as the violent exertion of flight requires. Their temperature, winter and summer, is $107\cdot6^{\circ}$, whereas ours is only $98\cdot4^{\circ}$. When such a furnace as this has to be fed, would it be possible to sleep for six months because of the lack of food ? No, obviously not.

What, then, do the birds do? Since they cannot resort to the Bat's methods they take a bold resolve. They leave their native land, which will soon be dispeopled of insects by the cold; they go far, far away, with stricken hearts, but with the hope of one day returning; they emigrate, the strong encouraging the weak, the old, expert in travel, guiding the young and inexperienced; they organize caravans and fly toward the South, to Africa, where abundant food and a warmer sun await them; without other compass than that of instinct they cross the sea, the wide sea, where there is no resting-place, unless, at long intervals, some island emerges from the waves; many perish on the way, and many arrive exhausted by hunger, broken with fatigue; but, after all, they arrive.

JULES.—The Swallows must find the moment of departure very hard to bear.

PAUL.—Hard indeed, for the bird tears itself from the place it loves, from the spot where it was born, to brave the fatigues and the dangers of a tremendous journey; for the greater number a journey into the unknown. The day of departure is fixed in a great assembly; about the end of August for the House-Martins and Sand-Martins, and later—even as late as October—for the Swallows. When the appointed time has come the House-Martins gather, for several days in succession, on the tops of tall buildings. At every moment bands detach themselves from the general assembly to wheel through the air with anxious

cries, once again to behold their native countryside and to take their last farewell of it ; then they return to take their place amidst their companions, chattering and warbling doubtless of their hopes and fears while preparing themselves for the great adventure by a careful inspection of their plumage, preening it feather by feather. After many repetitions of these touching farewells a plaintive warbling announces the fatal hour. In a despairing flight the travellers take wing together southwards.

The Swallows assemble together, at the time of departure, on some leafless tree, almost always in rainy weather. The emigrant bands are three or four hundred strong. The Sand-Martins commonly companion them, both going and returning.

XXX

THE SWIFT—THE NIGHTJAR

PAUL.—The *Swift* is the big black Swallow (or so it seems) that flies in flocks on summer evenings, crying shrilly as it goes. The aerial chase of insects is its allotted calling. The bill is very short, but opens very widely; the throat is capacious, and always coated with a tenacious viscosity that holds the game captured; the wings are long and pointed, enabling the bird to travel, in sudden rushes, at a pace of two hundred miles an hour; and the piercing eyes can distinguish a gnat at a distance of a hundred yards and more. Any insect that ventures far above the ground is lost; the open bill of the Swift is a living net, a net that rushes down upon it and engulfs it. If the bird has young it collects the insects for a time in its cheek-pouches, and then returns to the nest, to distribute rations with its wide gullet crammed with flies, moths and beetles.

What an extermination of the insects that haunt by twilight is effected by the Swifts, when their screaming bands come and go, in endless circuits, against the calm sky flushed by the setting sun!

What impetuosity in flight ! How they rush through space ! What dash and vigour ! Some seem to flutter at random, some softly float through the air, for the mere pleasure of using their wings, others describe circles, crossed indefinitely by other circles ; others soar upward vertically, hover a moment without moving their wings, then suddenly beat them swiftly, or let themselves fall from on high as though wounded ; others follow the course of a street ; they race one another to the farther end, return to the point of departure, and begin again ; others, all crying in chorus, whirl in a flock round some lofty building. See this bird, approaching so swiftly ! It has passed us with three wing-beats ; now it is already lost in the dim distance ! What impetuosity ! What a wonderful flight !

ÉMILE.—There is one thing I have often wished when I have been watching the Swifts. Why have not I their wings, to carry me to the lofty blue mountains we can see from here ! Why have not I their power of flight, to take me to the high peaks and bathe in the cool air, among the clouds, and bring me back as quickly !

PAUL.—Such wishes occur to us all ; it occurs to us all to envy the Swift its wings, but no one would wish to have its feet !

ÉMILE.—Why ?

PAUL.—They are so short, so awkwardly shaped, that the bird cannot use them for walking. All four

toes are pointed forwards. This amounts to saying that the Swift does not perch, as it cannot take hold of a branch or twig ; its only resource is to cling to the walls, to rest a moment, and then resume its flight, allowing itself to fall as do the Bats.

“ The Swifts fly of necessity. Of their own accord they never alight on the ground ; and if they fall upon it by accident it is only with extreme difficulty that they can rise into the air again, by dragging themselves to some clod of earth or climbing with beak and claws on to a stone, on which they can unfurl their long wings. If the ground is quite level they lie on their breasts, quivering and swaying uselessly from right to left, or progressing a little by beating the ground with their wings. After many efforts they sometimes manage to take flight. The earth is for them, therefore, a vast reef which they must avoid with the greatest care. For them there are practically only two modes of existence : violent movement or absolute repose. To roam through the meadows of the air or to lie hidden in their nests ; such, for them, is life. The only intermediate condition is that of clinging to the walls close to their nest-holes, and then dragging themselves into their nests, making use of their beaks and all the points of support which they can utilize. As a rule they enter their nests in full flight ; and having passed and repassed them a hundred times, they suddenly dart into them, so swiftly that one loses sight of them

without knowing where they have gone ; one would almost be tempted to believe that they had become invisible.” †

This nest is almost always situated in a deep hole in a wall, at a great height from the ground. It is composed of threads of hemp, small bundles of tow, shreds of rag, bits of straw, feathers and down from the catkins of willows and poplars. These incoherent materials are stuck together and agglomerated by means of the viscous humour that oozes constantly from the Swift’s throat, and serves as an adhesive trap to entangle the insects which the bird snaps up as it flies. This the bird spreads over the nest ; soaking the various courses with it as they are laid. This humour hardens as it dries, acquiring the shiny look of a gum, and gives the whole structure strength and even elasticity. The nest may be compressed between the hands without breaking, and when the pressure is removed it returns to its original form.

The Swift itself provides the binding cement, but where does it find the materials—tow, rags, straw and feathers ? Evidently it will not make the mistake of seeking them on the ground, where it might find them, just as the other birds do ; for if it touched the ground it would infallibly become a castaway, a wreck. Cunning comes to its aid. As it reaches this country rather late in the spring it profits by the holes already deserted by the sparrows ; there it

† Guéneau de Montbéliard.

finds abundance of material, which it arranges after its own fashion, sticking them together with its glue. If the sparrows are still housekeeping it impudently enters their nests, and rifles them, taking here a little down, there a little straw and a few feathers, and proceeds to make its own nest with the stolen booty in some hole in the same wall. The eggs, a pure white and of elongated form, are four or five in number. The Swifts are barely three months with us. They arrive after the Swallows, at the beginning of May, and leave again at the end of July.

The *Alpine Swift*^{*} differs from the Common Swift by its larger size and its white breast and belly. It is found in the neighbourhood of the Alps and Pyrenees; it is common along the Mediterranean coast, especially where the sea beats against high and precipitous rocks. It is not found in the centre and the north of France. Its flight is more rapid than that of the Common Swift, and as a rule it keeps to the upper air, flying low only when the weather threatens to be stormy. It makes its nest high up amid precipitous rocks, of moss and straw cemented with its viscous saliva.

The *Nightjar*, *Goatsucker* or *Fern-Owl* is closely related to the Swifts. Like the Swifts, it has a short beak, very broad at the base, and opening excessively wide; and the inside of the mouth and throat is coated with a thick ropy saliva, to snare its insect

^{*} Known in England as an occasional passing migrant.—Tr.

prey. It is about the size of a thrush. Its plumage is light and soft, of mingled greys and browns ; its eyes are large and prominent, very sensitive to light ; the corners of the mouth bristle with long hairs ; the legs and feet are small, but adapted to walking.

As indicated by the sensitive eyes, which are dazzled by the daylight, and by the springy softness and the greyish tint of its plumage, which resembles that of the Owls, the Nightjar is a creature of the twilight ; it is the nocturnal Swift. It takes flight and goes a-hunting only when the sun is near to setting. In the last light of the summer evenings it inspects the ground, flying very low and returning several times over the same track, as the Swallows do when grazing the ground. It flies with its beak wide open, and the air that enters its throat produces a low, continuous churring sound, like that of a wooden rattle. The bird almost seems to swallow the air as it flies ; hence its French name, *l'engoulevent*—the air-swallower. But it does not swallow the air merely for the pleasure of imitating the churring of a rattle^{*} ; its object is to swallow the crepuscular insects. The large beetles that disport themselves of an evening, cockchafers and dung-beetles, disappear into the sticky gulf of its mouth ; small moths, grubs and midges are entangled by the dozen in the treacherous glue. If the prey is large the bird swallows it instantly, alive and

* According to some authorities the bird "churs" when lying along a bough or fence-rail, and does not hunt with open mouth, but snaps up any insect in its path.—Tr.

whole ; if small it waits until a number of insects are limed, and then swallows them in a lump, to make only a single mouthful of them.

ÉMILE.—It swallows the big dung-beetles and cockchafers alive ?

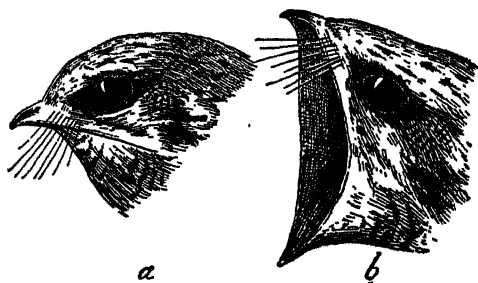
PAUL.—You can imagine that in its swift pursuit of its prey the bird has no time to dissect its capture. To rush down upon the insect with open mouth, snap at it, snare it and swallow it—all this is done during flight, without a moment's halt or delay. The big beetles are no sooner caught than they go down, struggling, into the bird's crop.

ÉMILE.—By the time a dozen have been swallowed there must be a queer sort of disturbance in the bird's stomach.

PAUL.—Many birds, in the Nightjar's place, would find their digestion upset by a handful of dung-beetles and cockchafers kicking about in their stomach and tickling its walls with their strong spurred legs ; but I rather think the bird has the means of quieting them at once, by asphyxiating them with its digestive juices. Since its business is to stuff its crop with great living beetles it must have some way of preventing them from perforating its stomach. None the less, I admire its power of digestion. There's nothing like the animals for stomachs that nothing will upset.

Seen close at hand in the exercise of its calling the Nightjar is not a beautiful bird. Its flat head, its

wide beak, whose opening seems to split the head in two, its hideously gaping throat, red and sticky and sprinkled with the broken relics of moths, and its great prominent eyes give it rather the look of a toad. This is why it is sometimes called the "flying toad." Its more usual name of *Goatsucker* is due to a false interpretation of one of its habits. The Nightjar likes to haunt the neighbourhood of byres and sheepfolds, to give chase to the dung-beetles attracted by the



THE NIGHTJAR'S BILL.

a, closed ; *b*, open.

droppings of the flocks and herds. Seeing the bird appear in the midst of their sheep and goats, the shepherds and goat-herds have supposed they have come to suck the milk of their charges. If they had examined the bird more closely they would have realized the absurdity of such a supposition. A bird sucking milk—come, come ! But the more ridiculous an idea is the better its chance of propagation ; and the absurd name of *Goatsucker* is better known in

many districts than the just and expressive name of Nightjar.

This bird comes to us from the warm countries about the month of May and leaves us in September. It builds no nest, in that following the practice of many of the nocturnal birds of prey. Some hole in the ground, or in a heap of stones, at the foot of a tree or a rock, left, as a rule, just as found, suffices the bird as a refuge for its eggs, which are two or three in number, with bluish and red-brown spots on a white background.

To sum up : I commend to your attention these big, wide-mouthed birds, these hunters of insects on the wing, and especially the Swifts and Swallows and Martins, those incomparable defenders of our granaries, gardens, wardrobes and persons. What would you think of anyone who possessed the abominable secret of creating bushels and bushels of clothes-moths, gnats, daddy long-legs, weevils, and all sorts of destructive insects, and let the calamitous brood of vermin loose upon the breeze ?

LOUIS.—He would be doing an abominable thing.

PAUL.—Well, that is just what the man does who kills a Swallow. To be exact, he does not create the moths and gnats and weevils, but he saves the lives of those the Swallow would have eaten ; he is doing something quite as abominable as though he were creating them expressly to set them loose upon us. He is committing an impious act, for he welcomes

with a charge of shot the lovely, joyous creature, the messenger of Spring, that comes, full of confidence, to beg for hospitality under the eaves of his house ; he is helping the forces of famine, for he is favouring the multiplication of the race of devastators that levy tribute on the goods of the farmer to the yearly value of millions of pounds ; whose numbers grow daily more formidable when those of the insect-eating birds decrease. The man who slays a Swallow is, indeed, committing an impious act, an abominable act, an act that helps the creators of dearth.

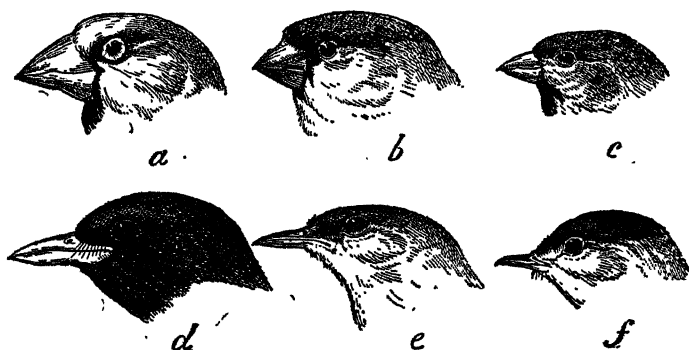
XXXI

THE BEAK

PAUL.—There are many other small birds that live almost exclusively on insects and thereby render notable service to the farmer. To describe them all in detail would take too long ; moreover, most of them are familiar to you ; for you see them every day in wood, garden, orchard and field. I will confine myself to the essential feature that distinguishes the insect-eating birds from the seed-eaters. A few details as to the habits of the more important species will complete my rapid survey.

The food of the small birds is of two kinds : it consists of seeds or of insects. Some require millet, hemp, pips, kernels and seeds of all sorts ; others require small worms, grubs, caterpillars, insects. The kind of food eaten is determined by the form of the bill, just as the diet of the mammifer depends on the structure of the teeth. The grinding molars of the horse and the ox ask for forage which they can bray with their wide flat crowns ; the molars of the wolf and cat, with their sharp ridges, ask for flesh that they can cut into shreds. Similarly, the bird's

bill, accordingly as it is formed in this fashion or in that, is large or small, weak or powerful, asks for hard seeds that crack in the mandibles and open, yielding their kernel, or soft grubs which do not require to be crushed before they are swallowed. Show me your teeth, we say to the mammifer, and I shall know what you eat. Show me your bill, we



VARIOUS BEAKS.

Graminivorous Birds { *a*, Grosbeak.
 b, Bullfinch.
 c, Sparrow.

Insectivorous Birds { *d*, Blackbird.
 e, Nightingale.
 f, Blackcap.

should say to the bird, and I shall know whether you live on seeds or insects. The bird that lives on seeds, the *graminivorous* bird, has a strong, conical beak, wide at the base, strong in proportion to the hardness of the seeds it has to crack; the bird that lives on insects, the *insectivorous* bird, has a slender, delicate bill, weak in proportion to the softness of the vermin which it captures. In common parlance we make a distinction between the hard-billed and soft-billed

birds. But the hard bill is usually the big, strong beak, so we may formulate the rule : seed for the big beaks, grubs for the fine beaks.

And now, let us at once put the rule into practice. Here is a bird of which, perhaps, you know neither the species nor the diet. If I ask you to tell me what it eats from the formation of its beak, will you be able to tell me ?

JULES.—Such a powerful beak, so wide at the base, surely cracks the hardest sort of seeds.

ÉMILE.—That bird must certainly live on seed ; it is written on its big face.

PAUL.—It is, indeed, an eater of seeds of all sorts ; it is the *Greenfinch* of our thickets, greenish on the back, with the edges of the tail yellow. The dominating colour of its costume, green mingled with yellow, has earned it the name of Greenfinch. And this ?

ÉMILE.—For the big beaks seed, for the fine beaks grubs. This is not a strong beak ; it is rather long, but slender ; the bird is an insect-eater.

PAUL.—And one of the most zealous, for it belongs to the family of the Warblers, those delicious singers, who would be afraid of spoiling their voices if they were to eat dry, floury seeds. To preserve the harmonious flexibility of their throats these incomparable artists require the refined fat of caterpillars, and tender mouthfuls of larvæ ; they would take care to avoid hard seeds that would spoil their voice.

This is the *Reed-Warbler*, that lives on dragonflies,

small chafers, gnats, and gadflies snapped up in flight. It nests in osier-beds, among the reeds. It is a rufous brown on the back, and the under parts are yellowish-white.

Now, here is a third and last example.

ÉMILE.—Another fine bill ; another insect-eater.

PAUL.—Yes, it's an easy one. The bird is the



CROSSBILL.

Water Wagtail, because it haunts the streams and jerks its long tail at every step. It is sometimes called the Dish-washer in England, and in France the Washerwoman, because it frequents the river-banks where women wash their clothes ; and in France, again, it is also called the Shepherdess, because it loves the company of shepherds and their flocks. The back is ashen grey, the belly white, and there is

black at the back of the head and on the throat and breast.[†]

The Wagtails run gaily along the sandy banks of streams in search of vermin. Every now and again they rise a few feet from the ground, hover, twirl about, and flutter to earth again, alighting on some slight elevation. We see them also running along in the fields, among the sheep, on whose backs they settle, even when the shepherd is at hand, to capture the insect parasites under their wool. They live on small slugs, butterflies and moths, flies, and larvæ.

The *Blue-headed Wagtail* has an olive-green back, and a slaty-blue head; the breast and belly are yellow and the eyebrows white. It frequents, in large companies, high ground and ploughed land, which offers it an abundance of its usual food—small worms, grubs and midges. In summer it is found in moist places, and in pastures, where it often follows the flocks.

Between the birds that live exclusively on seed or on insects we must class, in respect of diet, those that are addicted to a mixed diet, eating, indifferently, insects, seeds, grubs and berries, according to season, locality and circumstance. Their beaks have not the robust conical formation of the purely graminivorous birds, nor are they thin and delicate like the bills of the insectivorous birds; they are intermediate between

[†] The description fits either the Pied Wagtail or the White Wagtail. In the latter the black of the head and the black of the throat do not meet.—TR.



SOME INSECT-EATERS: II.

a, Marsh-Warbler. *b*, Wagtail. *c*, Skylark. *d*, Thrush
e, Blackbird. *f*, Golden Oriole and nest. *g*, Starling.

($\frac{1}{4}$ natural size.)

To face p. 262.

these two extremes. This form of beak, useful for all purposes, is the appanage of the *Skylark*, the joy of our ploughed lands ; the *Thrushes* and *Blackbirds*, lovers of berries, but no less fond of insects ; the *Golden Oriole*, superb in its black and yellow dress, which loves cherries, garnished with a few choice and tasty caterpillars ; and the *Starling*, whose bill of fare includes fruit, insects, slugs and various seeds.

The *Starling* is a handsome bird, almost the size of the *Blackbird*, with a dark dress all gleaming with metallic reflections. It is a lustrous black, changing to brilliant green on the head and wings and violet on the breast and back. The tips of most of the feathers are adorned with a small spot of white with a rufous tinge. The *Starling* nests on the walls of creeper-covered buildings, in pigeon-lofts, and the hollow of trees. The nest, the exterior of which consists of straw and dried grasses with a lining of feathers, contains four eggs of a dull white, unspotted. The *Starlings* arrive in autumn. They fly in great flocks which eddy and swirl like grain winnowed in a sieve, emitting piercing cries. They settle in the marshes and in moist meadows, where they destroy great quantities of vermin.

XXXII

THE INSECTIVOROUS BIRDS

PAUL.—Now let us return to the enumeration of the principal soft- or fine-billed birds, exclusively insectivorous, and therefore helpers of the greatest value. They are all of small size, delicate and graceful in shape and modest in costume. Among them are the talented singers, the artists whose trills and roulades make the foliage resound with the fresh cantata of springtime.

First of all comes the *Nightingale*, drest all in brown, save the under parts, which are a dull white. Listen to it on a still evening in May ; all things are silent, that they may lose not a note of the bird's hymn. It begins with a few timid cadences :

Tiu-u, tiu-u, tiu-u, tiu-u,
Tshu, tiu, tokua.

Then its song grows more animated :

Tio, tio, tio, tio, tio,
Kuwtiu, kuwtiu, kuwtiu, kuwtiu,
Tskuo, tskuo, tskuo, tskuo,
Tsii, tsii, tsii, tsii, tsii, tsii.

The phrasing becomes accentuated, the melody accelerated :

Dlo, dlo, dlo, dlo, dlo, dlo,
Kuyu, trrrrrrritz !
Lu lu lu, leu leu leu, lî lî lî lî.

Then comes a burst of ecstasy ; the bird abandons itself to the most brilliant roulades ; but our harsh alphabet is powerless to follow the flexibility of this marvellous throat.

The Nightingale, says Buffon, begins with a timid prelude, by faint and almost undecided notes, as though testing its instrument and seeking to interest its hearers ; but then, gathering assurance, it gradually becomes more animated and displays all the resources of its incomparable voice. Loud, piercing notes, quick light beats of sound, chains of song, whose clear articulation is equalled only by its volubility ; a low inward murmur, hardly audible yet enhancing the brilliance of what is heard ; precipitate roulades, brilliant and rapid, articulated with energy, even with a certain lovely violence ; plaintive accents, softly cadenced ; a succession of sounds artless but instinct with emotion ; enchanting and piercing notes that seem to issue from the bird's heart and touch the hearer's ; such are the impassioned tones by which, in language assuredly full of feeling, this chorister of Nature seeks to charm his mate, or, in her presence, to compete with his jealous rivals for the singer's prize.

I have seen, in our countryside, barbarians who interrupt the adorable romance of the Nightingale with a charge of shot. They say that half a dozen

nightingales, spitted and roasted, make an excellent dish. Horrible! What a brute is man when he consults only his belly!

The Nightingale builds its nest in a brake, near the ground, and sometimes even amidst the roots of the bushes. The nest is composed of coarse grasses and oak-leaves, and is lined with horsehair and down; the olive-brown eggs are commonly five in number.

With the Nightingale are classed the Warblers, though for their singing they take second rank. There are, in Europe, thirty or more species. All feed on flies, caterpillars, small beetles, spiders and various grubs. Their nests are built with a great deal of skill. Some nest in the trees and hedges of our gardens; others prefer thickets and lonely copses; others choose hollows in trees and holes in walls; others build on piles over the waters of a marsh; that is, they bring together three or four slender reeds by means of ligatures and build their nest on this swaying support; others, again, are content with a hollow dug in the ground. Among the best-known Warblers I may mention the *Blackcap*, so called because of the black cap covering the top of the head and the nape of the neck. You will remember that the Blackcap is one of the Cuckoo's victims, as was proved by the nest we found lately at the end of the garden. Then there is the *Common Whitethroat*, a lover of thickets, orchards and gardens, the *Marsh-Warbler*, that haunts the banks of streams, and in the leafy osier-beds or willow-trees



SOME INSECT-EATERS: III.

a, Nightingale. *b*, Blackcap. *c*, Common Whitethroat *d*, Sub-alpine Warbler. *e*, Reed Warbler. *f*, Alpine Accentor. *g*, Robin. *h*, Wheatear.

($\frac{1}{3}$ natural size.)

To face p. 266.

repeats, in a harsh voice, twelve or fifteen times in succession, *trau, trau, trau, trau* ; the small Subalpine Warbler¹ that inspects our fruit-trees, saying *zip zap, zip zap, zip zap* ; the *Reed Warbler*, that builds amidst the reeds of marshes ; and the *Alpine Accentor*,² the guest of mountain chalets and the melodious singer of the high snow-peaks.

Now we come to the *Wheatear*, which flies from clod to clod on ploughed land or fallows, or from tussock to tussock on the downs, displaying, in its flight, the white of its rump. The back is ashen-grey, the belly a rufous white ; there is black on the wings, and a black patch round the eye. The Wheatear frequents ploughed land, in order to snap up the worm and grubs turned up by the plough. Its nest is under a lump of turf, in a stone-heap, a rabbit-burrow, or a hole in a dry wall. It is built of moss, grass and feathers. Its four or five eggs are a pale blue. The Wheatear prefers downlands or dry, stony uplands ; there one sees it in autumn, in large flocks, flying from rock to rock or tussock to tussock, grazing the ground.

Beside the Wheatears we may place the *Stonechat*, a small, quick, active bird, which we see always perched on the topmost twig of a thicket, or a briar, whence it repeats, with a little frisk of its body : *Ouistratra*, *ouistrata*. If from this observatory it sees an insect

¹ Only two appearances in England are recorded.—Tr.

² Very rarely seen in England.—Tr.

on the ground it launches itself into the air, seizes it, and immediately returns to its perch, by a sudden little rush in a curving line, after the fashion of the Shrikes. Its plumage is brown, with the breast a chestnut red fading to buff, and the throat black. The sides of the throat, the wings and the rump are touched with white. The Stonechat frequents the hedges of sown fields and dry pastures ; we never see Stonechats or Wheatears on moist ground or by streams. They build their nests and lay their five or six blue-green eggs amidst the roots of bushes, in the crevices of rocks, or in heaps of stones.

It would be a crime to forget the *Robin* or *Redbreast*, to my thinking the most pleasing of all our small birds, with its wide-awake expression, its gentle gaze, its familiar curiosity, which brings it to gather up the shepherd's crumbs as he soaks his crusts in the clear water of a spring. It is the earliest riser of all the singers. From daybreak we hear the chattering, hurried notes, breaking into light modulations that recall some passages of the nightingale's song. Who is there that does not know its alarm call, issuing from the depths of some thick-set bush : *trit, tirititit, tirit, tirititit*, and its accosting cry when one of its own kind is passing : *wip, wip* !

The Robin's back is olive-brown, the throat and breast a bright warm red ; there is a blue-grey margin between the red and brown ; the belly is white. The Robin nests in the densest woodland thickets, between

the mossy roots of trees. The nest, consisting of leaves, hair, down, and feathers, contains five to seven dull white eggs with rufous spots.

In winter the Robin abandons its native wood and draws near to the homesteads and seeks its food even in our houses. God forbid that you should ever betray its trust when, on a bitter day of frost and snow, it raps discreetly with its beak on the window-pane, asking your hospitality. Welcome the poor famished little fellow ; he will repay you a hundredfold by his sweet warbling and his zeal in protecting the produce of the soil.

But this is enough about the soft- or fine-billed birds. At this stage you ought clearly to understand the immense value to the farmer of these legions of insect-eaters, who labour together in the fields, hedges, pastures, gardens, woods and orchards, and wage continual war upon all species of vermin, those terrible pests that would destroy our crops if others besides ourselves did not keep assiduous watch ; others more skilful, endowed with sharper sight and patience in the search, and having nothing else to do. My boys, I am not exaggerating : but for the insect-eating birds famine would decimate us. Who, then, except a destructive idiot, would dare to touch the nests of these birds, the gift of the good God, which cheer the countryside with their song and chatter and defend us against the devouring plague of insects ? There are, I know, cruel and barbarous boys who, if they

can manage to play truant, being tired of books and lessons, will make a pastime of inspecting the hedges, birds'-nesting, throwing out the young birds, that die in misery, and the eggs, pitilessly crushed. But the police are on the look-out for such pestilent fellows, and the law visits them with all its rigours, so that the fields, protected by the birds, shall continue to produce their harvest, and the orchards their fruit.

XXXIII

THE SEED-EATING BIRDS

PAUL.—I have been very severe towards those who destroy the insect-eating birds ; and, if only first appearances were to be considered, I should be equally indulgent in respect of those who kill the seed-eaters, for do not the birds addicted to a vegetable diet injure our crops ? Do they not feed in our cornfields, and gather an abundant harvest of seeds, buds, fruits and growing vegetables ? There are some that pick the grains of wheat from the ear and will boldly share with the hens the oats, scattered in the poultry-run. Others prefer the juicy pulp of fruits : they know before we do when the cherries are ready, when the pears are melting-ripe.

When you go to pick your fruit you will find only their leavings. There are some birds whose beaks are oddly formed to open fruits and cut them to pieces in order to reach the pips, their favourite tit-bit. Look at this bird's beak, and tell me if you know of a queerer tool.

JULES.—The two mandibles are crooked ; instead of

joining they cross one another like the blades of an old pair of scissors.

ÉMILE.—What can be the use of this crippled beak ? One point bends upwards, the other downwards. It could never pick up a grain of corn !

PAUL.—Consequently it does not pick up its food. Its manner of procedure is more complicated.

Let me tell you, to begin with, that the bird is called the *Crossbill*, because its two mandibles cross one another. This curious arrangement is not the result of an accident to the bird—the beak has not, for example, been twisted by a violent effort—it is not a crippled beak, as Émile calls it ; this is its natural state. The bird is born with this double-pointed beak, and never has any other form. It is very doubtful whether it would ever wish to change it, even if it could, so useful does it find it for the work it has to do. The Crossbill, above all things, loves the seeds of the pine-tree. Take a pine-cone and raise one of the scales with the point of a knife. You will find, at the back of each scale, two oily seeds, with a faintly resinous odour. This is the delicacy which the bird is after. But how is it to be extracted from under the scales, which are so hard and so firmly packed together ? The Crossbill might hammer in vain on these scales with its hard beak ; it could not force them to open ; even we ourselves, with a knife, could hardly do so. Yet the Crossbill makes nothing of this difficult task ; it insinuates the point of one mandible under

the scale, and getting a purchase on the other it exerts a twisting leverage, and in no time the scale is lifted and the seed comes out.¹ The wards of a key turning on a pivot do not more readily overcome the spring of a lock.

JULES.—I should have had more respect for this beak, which I thought, at first, so clumsy; it is an admirable key for forcing the locks of the pine-cone.

PAUL.—This beak is no less excellent for quartering an apple and reaching the pips. I should not care to have many Crossbills in an apple-orchard; they would soon cut my fruit to pieces. Fortunately, these birds prefer cold and mountainous regions, covered with dark pine-forests, rather than the plains. Their plumage is a bright red more or less blotched with yellow or green. The Crossbills nest in the colder European countries, and build their nests even in the depths of winter. The materials are mosses and lichens, rendered impermeable to the moisture of the snow by a coating of resin.

I shall not plead the cause of the Crossbill; its love of the pips of apples and pears makes it, to my thinking, highly suspect; but I will tell you certain facts that occur to me in favour of the seed-eating birds in general. To begin with, most of these birds feed on the seeds of wild plants, which are of no value

¹ According to Mr. T. A. Coward, the cones are first plucked, and then stripped, from the base upwards, or else the scales are split. Probably the method is the same, the scales splitting when they refuse to be unseated.—Tr.

to us, if they are not actually harmful when occurring in our fields. We hoe our crops, clearing the land of the weeds that exhaust it to no good purpose. Many of the seed-eating birds weed our crops after their own fashion ; they gather the seeds that would otherwise infest our fields. For example, should we not recognize the good offices of the *Goldfinch*, sometimes called the Thistlefinch, which, when the thistles are ripe, settles on their prickly heads and searches their down for the seeds ?

JULES.—It gets one of its names from its love of thistles ?

PAUL.—Yes. I shall not describe this pretty little bird, so familiar to all of you.

ÉMILE.—It has red on the head, and on the wings black, yellow and white.

PAUL.—Its nest, one of the best constructed, is placed in the fork of some flexible branch. The exterior is composed of moss and lichens felted together with the down of thistles and other plants whose seeds are surmounted by silky plumes, such as the dandelions and groundsels ; the interior, skilfully rounded, is lined with a thick bed of hair, wool and feathers. The eggs, five or six in number, are white, speckled with reddish-brown, chiefly at the large end. The *Goldfinch* deserves our protection ; it cheers us with its warbling and devotes itself eagerly to the weeding of fields infested by thistles and groundsel.

I shall likewise plead in favour of the *Linnet* that



SEED-EATING BIRDS.

a, Chaffinch and nest. *b*, Goldfinch. *c*, Sparrow. *d*, Greenfinch.
e, Bullfinch. *f*, Yellowhammer. *g*, Linnet.
 ($\frac{1}{3}$ natural size.)

To face p. 274.

it feeds on all the small seeds of wild plants, and thus does very creditable work as a weeder. However, I cannot conceal the fact that it has a predilection for flax-seed—that is, linseed, from which predilection it derives its name. Hempseed, too, is a favourite food of the Linnet. But hemp and flax are not found everywhere, and the bird can very well do without them, gathering a host of seeds that are harmful to us. It prefers to nest in hilly districts, in the heart of some bush, often a juniper. The nest contains five or six white eggs with rufous spots. Its plumage is brown, with crimson on the head and breast.

In addition to their weeding, the seed-eating birds do a still more meritorious work. Seeds, it is true, provide their habitual diet, but they do not despise insects; most of them eat plenty of insects when they are abundant and easily caught. If they have not the patience to search for vermin in its more secret strongholds with the minute care displayed by the fine-billed birds, they at all events take advantage of those that good fortune brings their way, and regard a few grubs to season their seed as an excellent windfall. Again, the seed they prefer may not be plentiful in the district; the Goldfinch cannot always find thistle-seed nor the Linnet flax-seed; and what can they do then but be patient and eat insects?

Further, in their infancy, when, feeble as yet and unfledged, they are fed by their parents, many of the seed-eating birds are nourished on insects. The reason

of this is obvious. It will readily be understood that the delicate crop of a bird recently hatched has not the power of digesting such a hard, frugal fare as seeds. It must have something more substantial, more nutritious and less bulky, and above all more tender, like the hashed vermin properly prepared in the mother's beak. A little later, when the down is sprouting, small caterpillars will be served whole, and then insects, which, having some consistency, will prepare the stomach for the more difficult task of digesting seed. I will take a few examples at random.

The gay *Chaffinch* is an avowed seed-eater, a lover of hemp and millet. Now, what does it give to its nestlings?

It gives them smooth-skinned caterpillars, tender grubs, and insects chosen from those more readily digested. The same is true of the *Greenfinch*, whose plumage is a yellowish-green; the *Bullfinch*, with its rosy red breast and belly; the various *Yellowhammers*, that come in flocks in the winter to pick up the grain around our corn-ricks. The latter, however, are perhaps even more strongly addicted than the others to a diet of seed, since they have inside the upper mandible a hard tubercle specially for crushing it.

I might multiply these examples, but I prefer to linger for a moment over a bird more familiar to you all—the *Sparrow*. Here, decidedly, is a true seed-eater. It comes thieving in our fowl-runs and pigeon-lofts, stealing the food of our fowls and pigeons; and

it reaps a harvest in the corn-fields near town or village before we cut the corn ourselves. Many other offences may be laid to its charge. It strips the cherry-trees, rifles our gardens, digs up the sprouting seeds, and refreshes itself with our young lettuces and the first leaves of our green peas. But when the nesting season arrives the impudent robber turns helper ; indeed, we have few so efficient. Every three minutes at least the father and mother, in turn, bring a beakful of food for their babes ; and each time the meal consists of a caterpillar or an insect so large that it has to be quartered, or a grub, fat as butter, or a grasshopper, or yet other game. In the space of a week the brood will consume some three thousand insects, grubs, caterpillars and vermin of all species. I have counted, round a single sparrow's nest, the remains of seven hundred cockchafers, and in addition the relics of smaller insects were literally innumerable. All this food was required to rear a single brood. Think, then, how much vermin all the broods of a village must destroy ! After such services as these others may persecute the Sparrow ; for me, I leave him in peace as long as he does not make himself a nuisance.

My conclusion is this : seed-eaters and insect-eaters, hard-bills and soft-bills, fine beaks and large, all help us. Peace, then, to the little birds, the joy of the countryside and the warders of our crops !

XXXIV

SNAKES AND LIZARDS

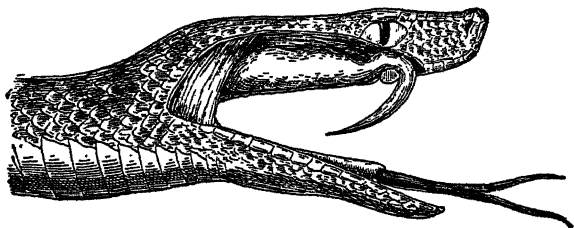
PAUL.—I propose to-day to plead in defence of the reptiles, a class of outcasts, regarded with horror by most of us, the victims of general execration. I have shown you what service the Bats render us despite the dislike which they inspire. I have enabled you to see in those creatures, that people call hideous and treat as enemies, valuable helpers, true swallows of the twilight, devoted to the extermination of crepuscular insects. When reason casts its rays into the darkness of prejudice, the detestable creature is found to be a very useful animal indeed. I shall try, in the same way, to enable you to disentangle truth from falsehood in the history of those other outlaws, the reptiles. Let us begin with the Snakes.

While, in explanation of our repugnance to bats, we can point to their appearance, which repels us by its strangeness, we do not find in the snakes the same motives for aversion. Their slender bodies are not without grace and beauty; the suppleness of their undulating movements is pleasing to the eye; their scaly skin is covered with bright colours which delight

us by their symmetry. Our aversion has its origin elsewhere. Some snakes are venomous ; they are equipped with a terrible means of inflicting death. Now, I certainly do not wish to reconcile you with these ; if it depended on me alone to crush and kill them, I would willingly rid the earth of them. Others, far more numerous, are devoid of any sort of venomous apparatus, and are thus perfectly inoffensive ; that is, unless they are so large that they can injure us merely by their muscular strength ; as they often are in the hot countries of the equator, but never in our countries, where the largest snake could not resist the efforts even of a child. Thus, some snakes are very greatly to be feared because of their venom ; the rest, at least in our country, are not in any way dangerous to us. But this fundamental distinction commonly escapes us. The bad reputation of the animal whose bite is deadly is generalized, without examination, and all serpents indiscriminately inspire us with horror, because we believe them all venomous. In Western Europe we have only one venomous serpent, the Viper or Adder ; all the rest, large and small, are harmless.

In relating the history of the destructive animals I have already told you of the Viper. I have described its form and colour, the structure of its venomous apparatus and the effects of its bite. In order to give you a complete account of our snakes, I will repeat here the more prominent features of the talk we had

then. All the snakes dart in and out, between their lips, with extreme rapidity, a black filament, very flexible, forked at the tip. For many people this is the reptile's weapon, its "sting," as they call it; but in reality this filament is merely the tongue, an absolutely harmless tongue, which the animal employs to snap up the insects on which it feeds, and to express, after its fashion, its emotions, by passing it rapidly in and out. All the Snakes without exception have



HEAD OF VIPER (SECTION).

a tongue, but in these parts only the Viper possesses the terrible venomous equipment.

This apparatus consists, firstly, of two fangs or long, sharp teeth, set in the upper jaw. These fangs are movable; at the will of the reptile they erect themselves for attack or lie in a groove in the gums, harmless as a dagger in its sheath. Thus, the reptile runs no risk of wounding itself. They are hollow, and pierced with a fine orifice near the tip, through which the venom is poured into the wound. Secondly, at the base of each fang is a small bag full of the venomous

fluid. This is an innocent-looking liquid, odourless and tasteless; you would think it was water. When the Viper strikes with its fangs the poison-gland drives a drop of its contents down the duct in the tooth, and the liquid infiltrates into the wound. It is in mingling with the blood that the virus produces its terrible results.

JULES.—I remember all that quite well, and also what we should do to prevent the venom from spreading into the general circulation.

PAUL.—The Viper, I told you, lives by preference on hot, stony hillsides; it lurks under the stones and in the thickets of brushwood. Its colour is brown and chestnut. It has along its back a dark, zigzag stripe, and on each side a row of spots, each of which corresponds with one of the re-entwining angles of the dorsal band. The belly is slate-grey. The head is rather triangular, larger than the neck, obtuse, and truncates in front. The Viper is timid and attacks man only in self-defence. Its movements are sudden, heavy and irregular.

JULES.—What does it feed on? Does it eat only insects, picked up with its tongue?

PAUL.—Its principal diet consists of larger prey, that calls for the employment of its venomous weapon. Small field-mice, harvest-mice, moles, sometimes frogs, and even toads are its usual victims. The animal surprised by the reptile is first stabbed with the poison-fangs; and the wound is at once followed by the death-

agony. When the prey is dead the Viper enlaces it in its coils, squeezes it forcibly and kneads it after a fashion, so as to reduce its circumference, for it has to swallow it whole, even though it be thicker than its own body. This preparation completed, the Viper's mouth opens to its widest extent; the two jaws apparently become dislocated, and with their sharp teeth, curving backwards toward the throat, they grip the head of the vole or field-mouse. A wave of saliva then soaks the carcass to render it more slippery; but the mouthful is such a large one that the Viper contrives to swallow it only with extreme difficulty. The gullet dilates and contracts, the jaws move alternately to the right and the left to draw the titbit in. Sometimes this laborious act of swallowing goes on for hours; sometimes all day. It is not unusual for one-half of the carcass to be already acted upon by the digestive juices of the stomach while the other half has not yet entered the gullet, but is still protruding from the mouth.

Now we come to the other snakes. None of these have poison-fangs; their teeth are of equal size, fine and weak, useful to hold the prey and assist the act of swallowing, as difficult as in the Viper, but incapable of inflicting a serious wound. Moreover, these are very timid creatures; at the least alarm they make haste to escape. If retreat is impossible the snake puts up a bluff to impose on the enemy; it coils itself into a spiral, raises its head, sways it to and fro

hisses, and tries to bite. There is no need to be alarmed by these threats ; the worst that can happen to us is that we may get a few scratches, no more serious than the scratches of a pin. Anyone who sticks his hand into a thorn-bush will be more seriously wounded by the thorns.

JULES.—If it is no more dangerous than that I should not hesitate to catch a snake with my hands.

PAUL.—I don't tell you this to encourage you to catch them and treat them as playthings ; on the contrary, I want you to leave them alone. But I want also to remove a fear that has no justification : the fear of snakes so general in country districts. Fear, a bad counsellor, never performs a meritorious action when it stones the snake found in some hole in a wall ; the passer-by kills it with his stick if he finds it crossing the road ; the mower, in the standing grass, cuts off its head with a stroke of his scythe. If he were not actuated by a silly fear, an unjustified aversion, he would leave the creature in peace and no one would be any the worse ; for snakes are not only inoffensive, they render us excellent service in destroying, for their food, a host of insects and small rodents, such as field-mice and voles. From this point of view the snakes deserve protection and not the implacable hatred which is usually accorded them.

LOUIS.—They say that snakes fascinate birds with their glance and draw them into their open mouths merely by the strength of their poisonous breath.

The bird cannot resist this magical attraction, and throws itself into the horrible throat.

PAUL.—There is a little truth in your remark, but more falsehood, the fruit of the popular imagination, which readily sees a sort of sorcery in the snake's habits. To begin with, there is nothing poisonous in the breath of any snake, nor anything magically attractive or supernatural. You have too much common sense for it to be necessary to insist that these stories are ridiculous. Then we come to the supposed fascination exercised upon the bird by the hard, fixed gaze of the reptile. The marvellous things related of the snake's gaze have but a slight foundation in reality.

Some of our snakes are fond of birds' eggs. They climb up the trees, seek out the nests and eat the eggs when the mothers are not there to defend them. It has happened to more than one nest-robber, who thought to grasp the brood of a jay or blackbird, to find under his hand, at the bottom of the nest, the cold, coiled-up body of a snake. I have known of cases where, overcome by horror at this unexpected contact, the robber has fallen headlong from the tree and broken his ribs—a warning to others ! Large snakes do not confine themselves to eggs ; they also devour the young birds, even those that are out of the nest, if they can catch them, which, fortunately, is not easy. Suppose a fledgling is suddenly surprised by a snake in the midst of a growth of brushwood. The poor little thing suddenly sees before it a hideous

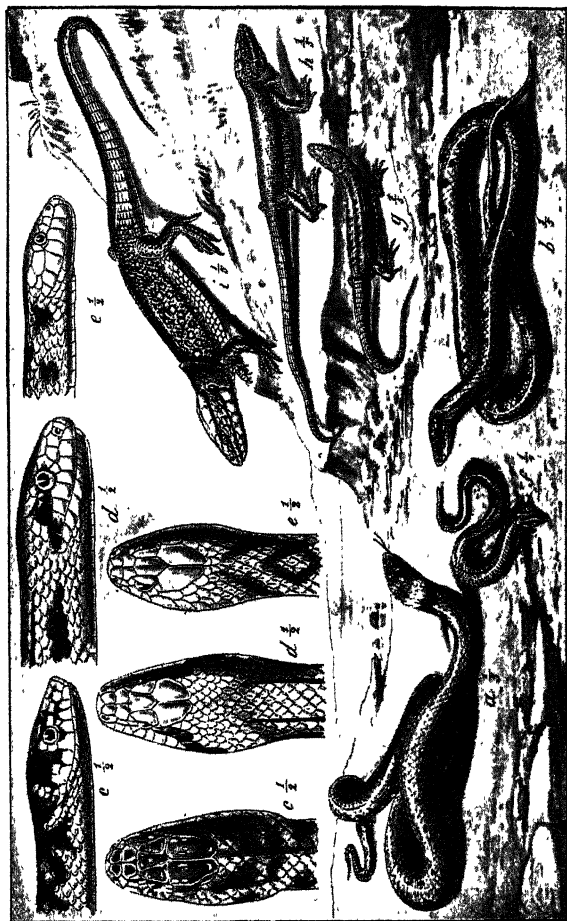
gaping throat and two glittering eyes that gaze at it with ferocious fixity. Bewildered with terror, the bird loses its head and no longer has the sense to fly ; it flaps its wings uselessly and utters plaintive cries, and finally drops from the branch, paralysed and dying. The monster lying in wait for it, catches it in its mouth.

The powers of fascination which are attributed to serpents is in reality merely the faculty of inspiring in the bird a sudden terror that paralyses its means of flight. Do we ourselves, when suddenly faced with terrible danger, always retain sufficient presence of mind to contend with it ? Are there not many persons who grow bewildered, no longer knowing what they are doing, and aggravate the situation by unreasoning actions ? The marvellous powers of fascination are reduced to this. I am inclined to think that the bird surprised by a snake has usually sufficient strength of mind to dominate its first feeling of fright and take flight as soon as it sees the horrible gape of the reptile ; so that the paralysing ambushes of the snake have little chance of succeeding save with quite young birds, as yet without experience of life. What will paralyse an innocent fledgling with terror will hardly affect a bird with greater self-control ; what terrifies a child or a person of feeble character will make little impression on a man who considers the danger. Accustom yourselves, my boys, to keep a calm mind in any critical position, and the lucid glance of reason,

and you will avoid a great deal of suffering, and escape many dangers, just as the bird that does not lose its head escapes the ambushed snake.

Let me now tell you something about our principal snakes. The most prettily coloured is the *Grass, Ringed, or Collared Snake*, so-called because of a pale yellow or dull white ring which forms a half-collar round the neck. The upper parts are a slaty-grey, lighter or darker, marked on either side with irregular black patches; the under side is mottled with black, white and a slaty-blue. This snake prefers moist places. It frequents stagnant waters, in which it swims easily, capturing small fish, aquatic insects and tadpoles. For this reason it is also called the *Water Snake*.

It commonly lays its eggs in manure-heaps, which assist incubation by their natural heat. These eggs are an elongated oval, with flaccid shells like moistened parchment. They are about the size of a magpie's eggs. They occur in strings, agglutinated by a viscous humour. On turning over a manure-heap, country-folk often find, under their pitchforks, these soft-shelled eggs, of whose origin they know nothing, and from which, to their great stupefaction, young snakes emerge. They profess that these are cock's eggs, unnatural products, tainted with sorcery, producing snakes instead of chickens. It is difficult to get this crazy idea out of their heads. As for you, my boys, if ever you hear of eggs laid in manure-



SNAKES AND LIZARDS.

a, Ringed or Grass Snake * ($\frac{1}{2}$). *b*, Smooth Snake * ($\frac{1}{2}$). *c*, Green and Yellow Snake ($\frac{3}{4}$). *d*, Striped Snake ($\frac{1}{2}$). *e*, Viperine Snake ($\frac{3}{4}$). *f*, Slow-worm or Blind-worm * ($\frac{1}{2}$). *g*, Grey Lizard ($\frac{3}{4}$). *h*, Green Lizard ($\frac{3}{4}$). *i*, Eyed Lizard ($\frac{3}{4}$). *j*, Slow-worm or Blind-worm * ($\frac{1}{2}$).

(* British species.)

To face p. 286

heaps by cocks and producing snakes, remember that these are simply the eggs of the Ringed Snake.

Beware, too, of another tale that is told in our villages. The same snake, it is said, shares with certain other snakes a tendency to introduce themselves, by way of the mouth, into the bodies of persons sleeping in moist grass. To rid the patient of this inconvenient guest the snake must be drawn out by the odour of hot milk.¹ Such tales are mere foolishness; no animal would ever think of taking refuge in our stomach, where it would be digested just as a mouthful of bread is digested.

Another common snake, the *Green and Yellow Snake*, lives by preference in retired woodland spots. The back is very dark green, with a large number of stripes consisting of yellowish spots of different shapes, some elongated, others lozenge-shaped, larger on the sides than in the middle of the back. The belly is yellowish. Each of the large scales that cover it is bordered by a very narrow black line and adorned by a black spot at either end.

The *Smooth Snake* is very like the Ringed Snake, the chief difference being in the scales, which are smooth and even, while those of the Ringed Snake have each a fine ridge in the middle. The back is slaty-blue and rufous, and adorned by two rows of small blackish

¹ A stomach-worm, sometimes infesting cats and children, is occasionally vomited with the gastric juice secreted on scenting food, and may possibly have given rise to this superstition.—Tr.

spots. The point of each scale is brown. The belly scales are very smooth and shiny, and slightly transparent, in colour white with rufous spots. This species is commonly found in shady valleys.

The *Viperine Snake* is not unlike the Viper in form, which is not quite so slender as that of the other snakes, and above all in the series of brown spots forming a zigzag line along its grey-brown back. On either side is a series of smaller spots, eye-shaped and irregular ; the belly is diapered with black and grey. The scales of the back have a slight ridge in the centre. Despite its sinister name, this snake has none of the Viper's venomous quality ; it is absolutely harmless, and frequents moist places and the banks of ponds, while the Viper inhabits dry and stony spots.

In the South of France we find the *Striped Snake*, which reaches a length of six feet. It is the largest of the European snakes. The back is rufous, with four longitudinal brown stripes. It lives in the brush-wood of dry hillsides.

In the fields, and even in the cut hay, we often find a small serpent which in its structure is unlike the snakes. It is the Slow-worm or Blind-worm. The head is small, and the neck is not constricted ; on the other hand, the tail is blunt, so that the two extremities of the body have almost the same diameter, leaving us for the moment uncertain where to look for the head. The Slow-worm is covered with very smooth, glossy scales. The back is a silvery yellow, with three

black stripes running from end to end, changing with age into a series of points, and even finally disappearing. The belly is blackish. When startled the Slow-worm violently contracts, stiffens itself, and becomes almost as brittle as the tails of the Lizards.

This little serpent has been given a very bad reputation ; people say it is venomous ; that its touch and even its glance are harmful. This reputation is utterly undeserved. The Slow-worm is the most inoffensive of reptiles ; it does not even try to bite in self-defence ; it contents itself with stiffening its body until it is rigid as a stick. It lives chiefly on Scarabæi and earthworms.

To conclude : apart from the Viper, none of our snakes are venomous ; none can hurt us ; none can give us a serious bite. The non-Viperine snakes do us no manner of harm ; on the contrary, they render us service in destroying a host of insects and small rodents. Let us then overcome any unreasonable repugnance and dislike that we may feel for them, and let these helpers live in peace.

Let us also respect the Lizards, those agile hunters of insects, and even of small rodents. Who does not know our *Grey Lizard*, a lover of sunny walls ? It lies in wait for flies, licking its lips with its slender tongue, ferreting from hole to hole to snap up any passing insect. It is a great protector of wall fruit-trees. When on a fine day of spring the sun is shining brightly on some grassy bank or wall that augments

the heat by reflection, we see it outstretched in a sort of ecstasy on the wall or the young grass. It steeps itself joyfully in the beneficent heat, marking its delight by gentle undulations of its flexible tail; its eyes glitter, bright and animated; it rushes like a flash of light to seize some small victim or to find a more convenient shelter. Far from fleeing on the approach of man, it seems to regard him with complaisance; but at the least sound that alarms it, even at the fall of a leaf, it rolls over, falls, and remains for a few moments as though stunned by its fall; or it rushes off, disappears, returns, hides anew, and again reappears, describing in a moment a number of tortuous circuits which the eye can barely follow; turns round on itself a number of times, and at last retires to some refuge until its alarm has evaporated. As useful as it is pleasing to the eye, the little Grey Lizard feeds on flies, crickets, grasshoppers, earthworms, and almost all the insects that destroy our fruit and corn; so that it would be an advantage to us if the species were more plentiful. As the number of Grey Lizards increased, we should find the enemies of our gardens diminishing.

The *Green Lizard*, so common everywhere, in the hedges, on the skirts of woods, in grassy thickets, attains a length of twelve inches. The skin of the back is like a beautiful embroidery of green beads set off by black and yellow dots. The lizard runs nimbly, darting through the brushwood and dead leaves with

a sudden rush that always surprises and often for a moment alarms us. It rushes at the muzzles of dogs that attack it, and bites with such determination that it will allow itself to be carried off and even killed rather than unclench its teeth. Its bite, however, is not in the least venomous ; it bruises the flesh more or less, but does not introduce any sort of poison into the tiny wound. In captivity it becomes very tame, and will let itself be handled with pleasure. Its diet consists chiefly of insects.

The olive-growing districts of the South of France possess another lizard, larger and stronger, heavier and more thickset than the common Green Lizard. The Provençals have named it *rassade* ; the scientists call it the *Ocellated* or *Eyed Lizard*, because of the black spots like *ocelli*, that is, little rings or eyes, which cover the bluish back. This lizard inhabits dry hillsides exposed to the full heat of the sun. It digs a deep burrow in some sandy spot, usually under some overhanging stone. Confident in the strength of its jaws, its boldness is impressive. Not only will it fly at the muzzle of a dog ; it will even stand its ground against a man and will rush at him if too closely pursued. This courage has earned it an alarming reputation amongst the countryfolks, who believe it to be highly dangerous, more venomous even than the Viper.

Now Uncle Paul, who knows the *rassade* like the inside of his pocket, who has watched many of the species for days on end to study their habits, and has

attentively examined their jaws, to determine the nature of their bite, in order completely to convince himself—Uncle Paul assures all and sundry that the terrible lizard does not deserve its black reputation. The *rassade* is not in any way venomous; it bites severely, to be sure, breaking the skin seized and even biting a piece out, but without poisoning the wound; in short, it is hardly more to be feared than the ordinary Green Lizard. Its food consists of beetles, grasshoppers and small field-mice; so, despite the fear which it inspires, I hasten to class the Ocellated Lizard among our helpers.

NOTE.—The British lizards are the Common or Brown Lizard and the Sand Lizard.—TR.

XXXV

THE BATRACHIANS

PAUL.—I have left till the last the ugliest and humblest of our helpers: the Toad. With the Toad I will class the Frogs, on account of their close resemblance of form; and above all, because of the profound changes which these creatures undergo in passing from the egg to the adult state. In common parlance we call them, indiscriminately, *reptiles*, a name derived from a Latin word meaning “to crawl,” from the snake and the toad to the lizard and the frog; all those analogous creatures, whether bare-skinned or scaly, which have either very short legs or none at all, and crawl on their bellies. The scientist makes a judicious distinction: he gives the name of *reptiles* to the Snake, the Lizard, and other creatures which have a scaly skin and emerge from the egg in the form which they will always possess, while the toad, the frog, and some others, whose skin is naked, and whose first form is later replaced by a different structure, are known to him as *Batrachians*.¹ The reptiles do not undergo metamorphosis; but all the batrachians do. Just as the butterfly is first a

¹ From the Greek *batrachos*, a frog.

caterpillar, utterly different in its organization and way of life and diet to the animal in the perfect state, so the Toad, the Frog and the Tree-frog begin by being *tadpoles*, which have nothing of the creature's final structure and habits.

The term *tadpole* denotes the transitory phase of the batrachian. A big head, confounded with a round belly, ending suddenly in a flat tail—such is the creature in its early stages. There are no limbs, no organs of movement, save the tail, which lashes the water to urge the tadpole forwards, serving as both oar and rudder. The tadpoles of the Toad are small and quite black; those of the Frog are much bigger, silvery under the belly and grey on the back. All live in stagnant waters, in ponds warmed by the sun. The Toad's tadpoles need shallow pools, ditches or gutters with a few inches of rain-water, where they can come forward in their black ranks and stretch themselves flat on their bellies on the warm mud at the brink; the Frog's tadpoles prefer open ponds with dense vegetation where they can dive into deep water. They breathe the air dissolved in the water, as fish do; and like fish they die if they are long exposed out of water. In respect of their respiration they are, then, true fish. But when they have attained their final form the batrachians, on the contrary, breathe the atmospheric air and die of suffocation in the water. They have then the respiration of aerian animals. You have often seen Frogs and Toads in the

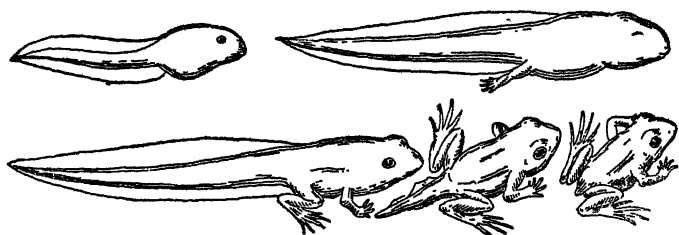
water, and you doubtless think they can live there indefinitely. They cannot: they go into the water only to lay their eggs, to escape from danger, or to take a bath in the hot weather; but they cannot remain long in the water without perishing. They must come to the surface at intervals to breathe the air by protruding their nostrils; if they are held under water by force they die. In respect of the fundamental vital functions, there is a first and very profound difference between the tadpole and the adult batrachian, between the larva and the perfect animal; the tadpole lives in the water and dies in the air; the Frog that comes from the tadpole lives in the air, and would die in the water.

Further: the tadpole lives exclusively on vegetable matter; its mouth is armed with a sort of little horny beak, for browsing on the water-plants; it has, in its little belly, a very long intestine, coiled several times upon itself, to prolong the time which its meagre nourishment spends in the maw and extract its thin sap. The adult batrachian exchanges this horny beak for true jaws armed with rugosities that serve as teeth; it feeds solely on animal matter, especially insects; and it has a short intestine, because the substances on which it feeds are easy to digest and readily yield up what nutriment they contain.

To turn the tadpole into a Toad or Frog, the metamorphosis is not confined to the complete alteration of the organs of respiration and digestion. Other

organs come into existence, of which the animal had not the least vestige when it emerged from the egg : others disappear without leaving a trace. The tadpole is born absolutely devoid of legs. After some little time the hind-legs begin to sprout ; later the fore-legs appear ; later still the tail disappears.

JULES.—I remember having seen tadpoles, some with two legs, and others with four ; but all had a tail.



METAMORPHOSES OF THE FROG.

PAUL.—When the tail has disappeared the creature is a tadpole no longer, but a little Toad or Frog.

ÉMILE.—Does the tail come off of itself, or does the animal tear it off ?

PAUL.—Neither one nor the other. The tail is too precious, during the process of metamorphosis, to be lost without profit. There are in it reserve materials, stores of substances able to form other things within the body. When the legs begin to grow, when the digestive and respiratory organs are reconstructed on new lines, these new creations, these profound alterations, are not procured out of nothing. The materials of flesh are required for the living edifice, just as



BATRACHIANS.

a, Salamander. *b*, Green Frog. *c*, Common Frog. *d*, Tree-Frog. *e*, Common Toad.
($\frac{1}{2}$ natural size.)

(The Salamander and Tree-Frog are not found in England.—Tr.)

To face p. 296.

bricks are needed for a house. The tadpole eats, of course, to make flesh and meet the expenditure entailed by the transformation, but this method is a slow one ; so to shorten it, life demolishes, particle by particle, the organs that are useless to the future animal, and utilizes the materials, rejuvenated by its processes, for its fresh creations. Thus it is that the tail disappears. The blood that circulates in its thickness gradually eats it away, dissolves it at the opportune moment, and carries off elsewhere the fluid substance, which, once more turned into flesh, and laid in its place, enters into the construction of the legs or some other part of the renovated body.

ÉMILE.—What economy ! The tadpole must not lose any part of himself, even if it is not so big as a pin's head ; it will serve to make the little toe of one of his feet !

PAUL.—Yes, my boy, it is a wonderful economy that does not allow a single atom of material to go astray ; in order that life, the divine artist, may constantly have at its disposal the integral sum of substances which the Creator confided to it for creations which are continually destroyed and continually renewed.

I must now inform you that certain batrachians keep their tails all their lives. Such are the Salamanders, one species of which, the Terrestrial Salamander, is an unusually ugly reptile. In shape it has something of the Toad and something of the Lizard. It is black, with large blotches of bright yellow. Its

length is from four to eight inches. It inhabits damp holes near springs ; it feeds on insects and earth-worms. Despite its repulsive aspect, it is a harmless creature.

Its tadpole breathes by means of fine tufts that display themselves in the water on either side of the neck. These respiratory tufts are known as gills or *branchiæ* ; they represent, in a different form, the respiratory organs or gills of fish, which are likewise placed on either side of the neck, under the sort of lid known as the gill-cover.



TADPOLE OF SALAMANDER.

The tadpoles of the Frogs and Toads during their first few days of life have tuft-or-fringe-

like gills, floating freely in the water, but they are soon withdrawn under the skin and become invisible, like those of the fish.

The Frogs are slender of body and not without a certain elegance. Their long legs are very long and powerful, eminently adapted for leaping, their principal mode of progression. The squatting Frog, doubled up on itself, so to speak, suddenly elongates itself like a spring released, and throws itself forward by a vigorous thrust of the thighs. The toes of the hind feet are deeply webbed ; that is, are joined together by a membrane, as are the toes of the swimming birds ; in particular, the duck. This arrangement of the toes as a wide oar or paddle, and

the flexibility of the hind-legs, which pack themselves close against the body, and then extend themselves, thrusting sharply at the water, make the frog an expert swimmer.

The *Green* or *Edible Frog* is spotted with black on a green ground. It has three yellowish stripes on the back, and the belly is a dull yellow. It is very frequent on the banks of all stagnant waters. This is the frog that fills the ditches with its hoarse clamour on summer coming.

The *Common Frog*, or *Yellow Frog*, has a reddish-brown skin with black spots. It is easily recognized by the black stripe which, starting from the eye, passes over the ears. It lives in cool places, moist fields, plains and thickets. It goes to earth more than the *Green Frog*, and croaks much less.

Both frogs feed on living prey, aquatic larvæ, worms, flies and other insects, and slugs, never touching vegetable substances; so they can be of service to us in the garden.

The *Tree-Frogs* differ from the common frogs by the viscous pads on the tips of their toes and fingers, which enable them to climb trees, where they diligently hunt for insects. They live among the leaves all the summer, and go to the water only to lay their eggs. Their voice, reinforced by a pouch which inflates itself under the chin, is very hoarse and loud. The *Tree-Frog* of our part of Europe is a beautiful tender green on the back and yellowish-white underneath.

XXXVI

THE TOAD

PAUL.—What shall I say in defence of that abject creature, the Toad, whose very name inspires disgust ? Here, indeed, is the outcast among outcasts, the reprobate that all hold in abomination. For us the Toad is ugliness personified, the creature in which all horrors are incarnated. What has the wretched creature done to earn such universal reprobation ?

It is ugly. Its soft, flaccid body is a shapeless lump, as though kneaded at random ; its black, dirty back is sprinkled with livid pustules. It is ugly. Its legs drag it along ignobly, being too short to raise its puffy belly from the mud. It is ugly. Its large head is cleft by a hideous mouth ; great protruding eyes are surmounted by swollen eyelids, revolting by their bestial fixity. It is ugly. If some danger threatens, it swells itself up, until a cushion of air, under its skin, protects it from blows by its elasticity.

It is venomous. Crouching in the mud at the bottom of some dark hole, it steeps itself in the unwholesome humours of the slime, to elaborate, in the pustules of its back, a milky venom that oozes forth and moistens

its body in moments of danger. It is venomous. It squirts into the eyes of its assailants a corrosive fluid, its urine, which burns them by its acidity ; it defiles the air with its fetid breath. It is venomous. From its throat flows a foam that poisons the leaves and fruits over which it crawls ; its progress is as disastrous as its aspect is revolting. It is ugly and poisonous. Therefore, war to the death on the hideous creature that defiles the earth, the air and the waters, and whose very glance is venomous !—That is what the Toad's accusers say.

What shall I say, in return, in defence of the wretch ? I shall tell the truth, the simple truth ; and the accusations piled upon it will reduce themselves to nothing.

I shall not discuss the question of the Toad's ugliness ; everyone must form his own opinion on that subject. Remember, however, our talk on the Bats.

JULES.—I don't think the Toad is dreadfully ugly. Its golden eye is full of light ; its voice is soft, almost flute-like, while the Frog's voice is a horrid croaking ; its swollen body certainly is not graceful, but after all it has its points !

ÉMILE.—The tiny Toads that jump about among the rushes beside the ponds look such queer, jolly little things, tumbling over every time they jump ! I have picked one up, but I shouldn't pick up the big Toads ; they frighten me.

JULES.—I shouldn't, either, for fear of their poison.

PAUL.—Their poison ! That is really the important

question ; not their ugliness, which is debatable. The Toad has the beauty that befits it, the beauty of the Toad, and could not possess any other beauty without ceasing to be what it is.

When they are irritated, the Toads exude, through the warts with which their skin is covered, a thick, viscous humour, having the appearance of milk. This liquid has a nauseous and burning taste, and is insupportably bitter.

JULES.—But has anyone tasted the milky sweat that flows from the Toad's warts ?

PAUL.—Some scientists have tasted it to inform us of its properties, just as others have tasted the venom of the Viper. You should have the greatest respect for these audacious inquirers, who are deterred by nothing if they can increase our knowledge and our welfare.

JULES.—I suppose when the Toad sweats this milky fluid on being attacked, it is trying in that way to defend itself ?

PAUL.—It hopes to repulse its assailants by the nauseous odour and horribly bitter taste of the secretion ; but it makes no other use of this humour, which would become a formidable weapon if the Toad could inject it into the veins of its enemies, as the Viper does its venom, which is forced into the wound made by the fangs. Here are some experiments made by the scientists of whom I was speaking but now :

A drop of the milky secretion of a Toad was intro-

duced by a needle-point into the flesh of a small bird. In a few minutes the bird staggered as though intoxicated, closed its eyes, gaped, and fell dead.

ÉMILE.—Really dead ?

PAUL.—Quite dead.—A dog was treated in the same way, but with a larger dose. In less than an hour it expired, the victim of a terrifying madness.

JULES.—Then this white sweat of the Toads is a horrible poison ?

PAUL.—Travellers assure us that certain of the South American Indians poison the points of their arrows with the milky secretion of the Toads. They impale a row of these animals alive on a long stick, which they then hold near the fire to excite the secretion of the pustules. In this liquid they steep the points of their arrows, a puncture from which is then deadly

JULES.—Then it is correct to say that Toads are poisonous ?

PAUL.—Yes and no. Externally the Toad's secretion has no effect ; to act as venom it must mingle with the blood in a wound. I need only repeat here the details already given in respect of the Viper's venom. But the Toad has no weapon of any kind which could cause the smallest flesh-wound ; it is therefore quite impossible that it should harm us. It has a venomous humour, but has no way of utilizing it other than infecting its body by its transpiration, and repulsing its enemies by a repulsive odour and taste. You can handle a Toad, if you wish to do so, without any

danger whatever ; you should wash your hands if the animal has soiled them with its liquid, and that is all. Unless the crazy idea occurred to us of collecting the humour ourselves on the point of a knife, in order to prick oneself with the poisoned blade, I assert, emphatically, that the Toad is inoffensive.

JULES.—That is quite clear, since it has no means of making a wound by which the humour can be introduced in order to act. But you said something about other poisons, of urine thrown to a distance, of the foam oozing from the mouth.

PAUL.—The Toad does not foam at the mouth ; it is absolutely untrue that the creature poisons fruits and leaves by dribbling on them. It is pure calumny to blacken the hated creature's character.

JULES.—And the urine ?

PAUL.—The Toad, if hard pressed, ejects its urine as a means of defence, but not very far ; one would need to be stooping close over it in order to get it in one's eyes. If this did happen to any foolish person the eyes would be bloodshot for a time and that would be the only result. For the rest, few people would take it into their heads to approach their faces to the repulsive creature. There is nothing to be feared in that respect.

JULES.—And the poisoned breath ?

PAUL.—Another calumny, like the tale of the Toad foaming at the mouth. Its breath is no more harmful than that of any other creature. Of the accusations

that weigh on the Toad nothing, then, is left : nothing worthy of mention. The humour that it exudes in moments of danger to repulse its enemies cannot injure us by its venom, since the animal has no means of introducing it into a wound and mingling it with the blood, a condition without which a venomous substance cannot operate. The jet of urine carries so short a distance, and its effects are so trifling, that it is not worth troubling about. Do we trouble about the urine of the Hedgehog, which soaks itself in this fetid liquid when persecuted ? That of the Toad, an analogous means of defence, is hardly more to be feared. The other causes of complaint—the swellings on the hands that have touched the Toad, the air poisoned by its breath, the fruits and vegetables dangerously infected—are prejudices of the popular imagination which has always delighted in giving the poor batrachian a detestable reputation.

The Toad is an inoffensive creature ; but this is not enough to commend it to our care. It is likewise a helper of great merit, a gluttonous devourer of woodlice, slugs, beetles, larvæ, and other vermin. Discreetly withdrawn during the day into the cool, moist cavity under a stone, or the obscurity of a hole in some overhanging bank, it leaves its retreat at nightfall to make its rounds, dragging itself slowly along on its big belly. Here is a slug hastening toward the lettuces, here a mole-cricket chirping on the threshold of its burrow, here a cockchafer laying its eggs in the ground.

The Toad comes up, very softly, its mouth opens like the entrance to a kiln, and in three gulps the three are swallowed, with a cluck of the gullet in sign of satisfaction. Oh, but that was good ! Now for more, if there are more !

The round is continued. When it is completed in the early dawn, I leave you to imagine what the glutton's capacious maw may contain in the way of assorted vermin. And this precious creature is destroyed, is stoned to death on the pretext of its ugliness ! Boys, you will never be so cruel, so stupidly mischievous ; you will never stone the Toad, for you would deprive the fields of a vigilant warder. Let it carry on its trade in peace ; it will destroy so many insects and grubs that you will begin to find it less hideous !

Toads are of such admitted service that in England they may be bought in the proper market. They are sold at so much per head ; and the purchaser carries the Toad home, taking care to do it no injury, and sets it free in the garden, or installs it in some glass-house, a palace of crystal in which grow the most wonderful plants. Its duty is to keep a look-out for woodlice, slugs, and other destroyers, which might set tooth to the precious plants. It acquits itself with scrupulous industry. What a change of fortune for the outlaw, when, in a warm atmosphere, balmy with sweet perfumes, it lives among the most sumptuous flowers, assembled, at great expense, from all parts of the

globe ! To complete the rehabilitation of the wretched Toad, to the honours of the blossom-filled glass-house are added the honours of poetry, that flower of human thought. Listen to this tale : A Toad, its head cut open, and one eye put out by the passers-by, was dragging its wounded body in the mud of the roadway. Four little boys come on the scene :—

The children saw it,
And cried, ' Let's kill this ugly animal,
And since it's ugly let us make it suffer.'
So, laughing—for the child laughs when he kills—
Each of them stabbed it with a pointed stick,
Enlarged the burst eye's orbit, wounding wounds,
Delighted, and the passers-by applauded,
Laughed as they passed ; and a sepulchral night
Came on the obscure martyr, who was dumb.
And blood, a hideous blood, from all parts flowed
O'er this poor thing whose crime was to be ugly.
He fled ; and then a foot was torn away.
And one child struck him with a broken spade,
And each blow made the wretched outlaw foam,
Who even though day was smiling o'er his head
Under the heavens, crawled as in a cave.
And the children said, " He is savage—how he foams ! "
His head was bloody ; an eye hung by a thread.
Through broom and bramble, terrible to see,
He crawled, as though by frightful talons torn.
Oh, a dark deed—to worsen misery !
Horror to heap upon deformity !
Crippled, but stumbling on from stone to stone
Still breathing, without refuge or retreat,
He crawled ; it was as though disdainful death
Refused him, finding him too horrible.
The children sought to snare him in a noose,
But he escaped, creeping along the hedge ;
A deep rut gained ; thither he dragged his wounds,
And bleeding, broken, with his cloven skull,
Plunged, and a coolness felt in that green slime,
And in that mud washed off man's cruelty.

And they, the children, Spring upon their faces,
Fair-haired and lovely, had never been so merry.
All spoke at once; the taller to the less
Cried: "Come and look! O, come and look, I say!
Now take a great big stone and finish him!"
One of the children brought a flagstone then,
Heavy, but light to lift for evil use,
And said: "Now we shall see what this will do!"
Now, at this very moment, to this spot,
This very spot, Chance brought a heavy cart,
Drawn by an ass, lame, old and thin and drear.
This ass, o'erdriven, limping, lamentable,
Nearing the stable after a day of toil,
Hauling the cart, a pannier bore as well;
It seemed as though each step must be his last.
Beaten, extenuate, he laboured on,
The blows descending on him in a cloud.
And in his eyes, veiled by a film, appeared
That dull stupidity that may be stupor.
The rut was deep; so full it was of mud,
So steep the hill, each turning of the wheel
Was like a long and groaning extrication.
The ass toiled, moaning, and the driver cursed.
Now the road went downhill and pushed him on.
The ass dreamed, passive, under stick and lash,
In depths where men exist not. Hearing now
The sounds of wheels and of the ass's feet,
The children, clamorous, turned, and saw the cart.
"Don't put the flagstone on the toad! No, stop!"
They shouted. "Look, the cart is coming down,
It will go over it: that's much more fun!"
All watched.

And now, advancing down the track
Where the poor monster his last pang awaited,
The ass beheld the toad, and he, sad beast,
Bowed o'er one sadder still, alas!—dejected,
Pressed to the earth, shattered and flayed and torn;
He seemed to scent him with his hanging head.
This patient, penal slave was merciful;
He gathered up his outworn strength; he strained
On chain and collar with his bleeding breast,
And disobedient to his driver's cries
Mastered the fell connivance of the load,

Accepted battle with his weariness,
Wrenching the cart and heaving up his load,
Haggard, he turned the inexorable wheel
And left the unhappy thing behind—alive ;
And, as the whip-lash fell, resumed his course.
—Then, as the stone escaped his hand and fell,
One of the children—he that tells the tale—
Heard, in the infinite vault of light and darkness,
A voice that said to him : “ Be kind ! Be kind ! ”

VICTOR HUGO.

And here I close the history of our friends and helpers, repeating, with the great poet : “ Children, be kind ! ” Be kind, if you wish God to love you ; be kind that you may grow to be men of noble heart ; be kind one to another, help one another ; be kind to the animals that give us their place, their strength, their life ; that defend the riches of the soil, assiduously watching over them, though all the reward that even the most wretched of them, the Toad, ever asks of us is a compassionate glance.

INDEX

- Alpine Accentor, 267
 Ass, teeth of, 18-21
 Audubon on the Eagle, 152-4
- Bank Vole, 123-4
 Barn-Owl, 100, 102, 142-5
 Bat, Horseshoe, 55-9
 Bat, Long-eared, 54, 59
 Bat, Noctule, 59
 Bat, Pipistrelle, 59
 Bat, Serotine, 59
 Bats, 33-45; teeth of, 33-4;
 feeding habits of, 34-8;
 sleeping-places of, 37; super-
 stitions regarding, 38; ser-
 vices rendered by, 39-40;
 young of, 44-5; wings of,
 46-53; crawling gait, 52;
 scent and hearing of, 54-9
 Beaks, of birds, 59, 258-63
 Beauty, 41-2
 Blackbird, 259, 263
 Blackcap, 204-5, 212-13, 259, 266
 Black Rat, 114-15
 Brown Owl, 140-2
 Brown or Norway Rat, 115-18
 Bullfinch, 259, 276
 Butcher-bird, 218-20
 Buzzard, Common, 166-8
 Buzzard, Honey, 168
 Buzzard, Rough-legged, 169
 Buzzards, the, 165-6
- Canine teeth, 17
 Carnivorous animals, teeth of, 26
 Carrion Crow, 176-8
 Cat, teeth of, 25, 27-8
 Chaffinch, 276
- Chough, 176
 Crossbill, 272-4
 Crows, 176-83
 Cruelty, stupid, 102-3
 Cuckoo, 204-13; habits of,
 206-10; of young Cuckoo,
 210-11; superstitions regard-
 ing, 214-15
 Cuckoo-spit, 215-16
- Dog, teeth of, 26; scent of, 55
 attacks hedgehog, 69
 Dormouse, 128; garden, 129-
 30; hibernation and storing
 habits of, 130-1
- Eagle, the, 147-54; eyelids of,
 149; beak and feet of, 150-1;
 attacks children, 151; Audu-
 bon's description of, 152-4;
 nest of, 155-6
- Falcon, common, 158-9
 Field- or Wood-mouse, 118-19
 Frog, Green or Edible, 299
 Frog, Tree, 299
 Frog, Yellow, 299
 Frogs, hibernation of, 79, 293,
 294, 298-9
- Goldcrest, 235-6
 Golden Oriole, 263
 Goldfinch, 274
 Goshawk, 156-7
 Graminivorous birds, 259, 271-7
 Green and Yellow Snake, 287
 Greenfinch, 260, 276
 Green Lizard, 290-1

Grosbeak, 259

Hamster, 126-8

Harrier, 164-5

Harvest Mouse, 119-21

Hedgehog, 60-9; teeth and diet of, 60-4; gluttonous habits of, 65-7; defensive methods of, 68-9; hibernation of, 71-2, 75, 77

Herbivorous animals, teeth of, 17-19

Hibernation, 70-9, 130-1

Hobby Hawk, 160

Hooded Crow, 178

Hoopoe, 202-3

Horse, teeth of, 17-19, 28-9, 30

House-Martin, 241-3

Hugo, Victor, 307

Insectivorous birds, 259, 264-70

Insects, vast numbers of eaten by bats and birds, 39-40, 221, 256-7, 269, 277

Jackdaw, 183

Kestrel, 162-3

Kite, 163-5

Lemming, 124-6

Linnet, 274-5

Little Owl, 145-6

Lizard, Green, 290-1

Lizard, Grey, 289-90

Lizard, Ocellated, 291-2

Lizards, hibernation of, 79

Long-eared Owl, 136-7

Mammals, mammifers, 43-4

Man, teeth of, 22-5

Marsh Warbler, 266-7

Merlin, 160

Milk teeth, 22

Mole, 80-94; voracity of, 81-4; teeth of, 82; diet of, 84-5; utility of, 86, 88-90; nest of, 91-4

Mouse, Common, 113

Nightingale, 259, 264-6

Nightjar, 252-6

Norway Rat, 115-18

Nuthatch, 198-9

Ocellate Lizard, 291-2

Owl, Barn, 142-5

Owl, Brown, 140-2

Owl, Eagle, 133-6

Owl, Little, 145-6

Owl, Long-eared, 136-7

Owl, Scops, 138-9

Owl, Short-eared, 137-8

Owlet, *see* Brown Owl

Owls, superstitions regarding, 98-101; utility of, 102; attacked by small birds, 105-6; hunting habits of, 106-9; feet of, 109-10; rejection of pellets, 111-12

Rabbit, teeth of, 29-32

Rat, Black, 114-15

Rat, Brown or Norway, 115-18

Rat, teeth of, 31, 113

Rats, 113-18

Raven, 170-5

Reed Warbler, 260, 267

Reptiles, 293

Ringed Snake, 286-7

Robin, 268-9

Rodents, teeth of, 30, 113

Rook, 178-83

Salamander, 297-8

Sand-Martin, 244-7

Scops Owl, 138-9

Short-eared Owl, 137-8

Shrewmouse, 95-7; superstitions regarding, 97

Shrike, Great Grey, 217

Shrike, Lesser Grey, 217-18

Shrike, Red-backed, 218-20

Shrikes, the, 214-20

Skylark, 263

Slow-worm, 288-9

- Smooth Snake, 287-8
 Snakes, 79, 278-89
 Sparrow, 259, 276; utility of, 277
 Sparrowhawk, 157-8
 Starling, 263
 Stonechat, 267-8
 Striped Snake, 288
 Subalpine Warbler, 207
 Superstitions, popular, 38, 63-4, 97, 102, 187-8, 190, 214-15, 283-4
 Swallows, 237-9, 243-9; utility of, 256-7
 Swan killed by Eagle, 152-4
 Swift, 248-52
 Swift, Subalpine, 252

 Tadpole, 294-8
 Tawny Owl, *see* Brown Owl
 Titmice, the, 221-30; quantities of insects destroyed by, 221
 Titmouse, Blue, 225-6
 Titmouse, Great, 223-5
 Titmouse, Long-tailed, 226
 Titmouse, Penduline, 227-30
 Toad, 79, 293, 294, 295, 300-9
 Tree-Creeper, 200-1

 Viper, killed by Hedgehog, 65-6, 279-82
 Viperine Snake, 288
 Vole, Bank, 123-4
 Vole, Field, 122-3
 Vole, Water, 124

 Wagtail, Blue-headed, 262
 Wagtail, Pied, 261-2
 Wagtail, White, 261-2
 Wall-Creeper, 201-2
 Warblers, the, 266-7
 Water-Rat, *see* Vole, Water
 Wheatear, 267
 Whitethroat, 266
 Wolf, teeth of, 17, 18-21, 25-7
 Wood- or Field-mouse, 118-19
 Wood-Owl, *see* Brown Owl
 Woodpecker, Great Spotted or Pied, 295-6
 Woodpecker, Green, 185, 193-5
 Woodpecker, Lesser Spotted or Barred, 196
 Woodpecker, Little Pied, 186
 Woodpeckers, superstitions regarding, 187-8, 190
 Wren, 231-5
 Wryneck, 196-8

 Yellowhammer, 266

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